

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

In Reply Refer To: HSST-1/WZ - 380

Pexco, LLC 3110 70<sup>th</sup> Ave East Tacoma, WA 98424

Dear Mr. Schulz:

This letter is in response to your May 1, 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 WZ - 380 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

#### **Decision**

The following devices are eligible within the length-of-need, with details provided in the form which is attached as an integral part of this letter:

• Type III Barricade with PSST upright and footing

#### 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 American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (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: Type III Barricade with PSST upright and footing

Type of system: Work Zone Test Level: MASH Test Level 3

Testing conducted by: E-Tech Testing Services, Inc

Date of request: May 1, 2018

FHWA concurs with the recommendation of the accredited crash testing laboratory as stated within 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 WZ-380 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 Griffith

Director, Office of Safety Technologies

Michael S. Fiffell

Office of Safety

**Enclosures** 

# Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

	Date of Request:	April 25, 2018	New	
	Name:	Craig Schulz		•
ter	Company:	Pexco, LLC		
Submitter	Address:	3110 70th Ave East - Tacoma, WA 98424		
Suk	Country:	USA		
	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
'WZ': Crash Worthy Work Zone Traffic Control Devices	( Triysical clash resting	Type III Barricade with PSST upright and Footing	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:	Craig Schulz	Same as Submitter 🖂
Company Name:	Pexco, LLC	Same as Submitter 🔀
Address:	3110 70th Ave East - Tacoma, WA 98424	Same as Submitter 🔀
Country:	USA	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.

Pexco, LLC is the manufacturer of the Barricade Panels - the product is sold as components and systems using uprights and feet as tested. These products are not protected by patents and have been sold for years on the open market.

Pexco, LLC sponsored certain crash tests of the PSST Steel Upright and Foot Type III barricade; these test were conducted by E-Tech Testing Services, an independent, wholly-owned subsidiary of Trinity Highway. Full crash testing of the product was conducted in June of 2017.

### PRODUCT DESCRIPTION

New Hardware or Significant Modification	Modification to Existing Hardware		*	
This product has been in successful use on the Nations highways for years, the testing was conducted to be compliant to to MASH guidelines for 12/31/2019 Sunset Dates for WZ products. The product is used to warn, close or inform roadway users to potential hazards and direct movement.  The product consists of three primary components:  1.) Three 1" X 8" UV stabilized High Density Polyethylene (HDPE) Hollow boards which are available sheeted with retroreflective tape in a variety of lengths from 4' -12' in length (12' was tested as this is worst case).  2.) Two 14 gauge PSST uprights(perforated square steel tube) 1.75" x 1.75" x 64" upright.  3.) Two of the 14 gauge PSST (perforated square steel tube) 60" long.  The boards are fastened to the uprights with standard nuts and bolts. The assembly is pinned to the feet with a quick release pin to withstand accidental removal, although designed to give on impact.  The entire assembly weighed in at 27 kg (59.4 lbs)  No sandbags or lights were used in testing.				
	CRASH TESTING			
all of the critical and relevant cra	r affiliated with the testing laboratory, a sh tests for this device listed above wer nined that no other crash tests are nece	e conducted to	meet the MASH test	
Engineer Name:	Paul Kruse			
Engineer Signature:	Paul Kruse		ned by Paul Kruse 5.03 06:46:27 -07'00'	
Address: 3617B Cincinnati Ave Rocklin, CA 95765 Same as Subi		Same as Submitter		
Country:	USA		Same as Submitter	

Country: USA
A brief description of each crash test and its result:

Required Test	Narrative	Evaluation
Number	Description	Results
3-70 (1100C)	Test not required as test article is less than 100kg	Non-Relevant Test, not conducted

		Page 3 of 6
Required Test Number	Narrative Description	Evaluation Results
	E-TECH Test 81-0462-001 Test Date: 6-27-2017	8
×	Per MASH, the test article is to be impacted on the critical impact point (CIP) at the critical impact angle (CIA) with an impacting 1100C vehicle at 100 km/hr. The	
	orientations chosen were to impact the test article at 0 and 90 degrees.  The purpose of this test was to analyze the	
	Pexco T3B Barricade with PSST Upright and Feet work-zone traffic control device's interaction with a MASH specified 1100C test vehicle and report the interactions	
	between the test article and test vehicle. The test was run using a grey primer over blue 2011 Hyundai Accent sedan.	
	For the 0 deg test article, the 1100C vehicle's front bumper first impacted the lower HDPE panel of the test article. As the lower panel began to wrap around the	
	vehicles bumper and the vertical uprights began to twist, the bottom of the middle panel contacted the vehicle's hood. The lower panel detached from the rest of the	
	test article and remained wrapped around the vehicle's front bumper, fenders, front wheels and front doors. As the middle panel slid up the hood, it wrapped around	
	the lower windshield and A-pillars and broke off the passenger door mirror. The test article then slid up the vehicle's hood and windshield slightly elevating the test	
	article off the ground. The middle panel detached from the uprights and elevated above the vehicle. The bottom of top panel contacted the vehicle's roof and slid over	
	the top of the vehicle slightly elevating the panel, with uprights still attached, above the vehicle. As the vehicle passed under the test article, the feet twisted towards the test	
3-71 (1100C)	vehicle. The passenger rear tire was struck by the edge of the foot causing a fast leak (i. e. not a blowout). The top panel with	PASS
, , , (, , , , , , , , , , , , , , , ,	uprights came to rest behind the test vehicle and remained attached.	
	For the 90 deg test article, the 1100C vehicle's front bumper first impacted the cantilevered lower HDPE panel of the test article. The lower panel was pushed forward	
	then buckled as the uprights began to deform. The lower corner of the middle panel then contacted the test vehicle's hood and buckled as it slid up towards the	
	windshield. The lower corner of the upper panel initially contacted the vehicle's windshield but did not result in any	

E-TECH Test 81-0462-002

Test Date: 6-27-2017

Per MASH, the test article is to be impacted on the critical impact point (CIP) at the critical impact angle (CIA) with an impacting 2270P vehicle at 100 km/hr. The orientations chosen were to impact the test article at 0 and 90 degrees. Both test articles were spaced 6 m apart.

The purpose of this test was to analyze the Pexco T3B Barricade with PSST Upright and Feet work-zone traffic control device's interaction with a MASH specified 2270P test vehicle and report the interactions between the test article and test vehicle. The test was run using a silver 2011 Dodge Ram 1500 Quad Cab pickup truck. The barricades were not fitted with any optional accessories.

For the 0 deg test article, the 2270P vehicle's front bumper first impacted the lower HDPE panel of the test article and the grill impacted the middle panel. As both the lower and middle panels began to wrap around the front of the vehicle, they detached from the uprights and remained on the front of the vehicle from most of the impact event.

3-72 (2270P)

For the 90 deg test article, the 2270P vehicle's front bumper and grill first impacted the cantilevered lower and middle HDPE panels of the test article respectively. As the lower and middle panels began to buckle, the first upright with foot was pushed ahead of the vehicle. The test article remained forward of the occupant compartment for the duration of the impact event.

No portion of the test articles engaged the undercarriage of the vehicle thus there was no notable damage to the undercarriage of the test vehicle (i.e. floor pan, foot well, oil pan, gas tank, trunk, etc.).

The test vehicle sustained negligible damage to the front bumper, hood and roof. The front plastic grill was damaged and slightly displaced. As the 0 degree test article wrapped around the front end of the vehicle, the upright on the passenger side contacted the passenger side mirror and a portion of the mirror detached. There was no damage to the windshield. The damage to the test vehicle was categorized as FC-0 (negligible) on the Vehicle Damage Index and as 12FCLW0 (negligible) on the Collision Deformation Classification Scale

PASS

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:	E-Tech Testing Services, Inc.	-
Laboratory Signature:	Timothy Mortensen Digitally signer Date: 2018.05	ed by Timothy Mortensen .03 11:58:52 -07'00'
Address:	3617B Cincinnati Ave. Rocklin, CA 95765	Same as Submitter
Country:	USA	Same as Submitter
Accreditation Certificate		
Number and Dates of current	A2LA Certificate 0989.01 (1/12/2018 - 11/30/2019)	
Accreditation period :		

Submitter Signature\*: Craig Schulz Digitally signed by Craig Schulz Date: 2018.05.22 13:10.47 -07'00'

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:

LIIGIDII	ity Letter	
Number	Date	Key Words
mber	Date	Key Words



#### Normal (0 deg) Orientation

#### Perpendicular (90 deg) Orientation

















t = 0.000 sec

t = 0.044 sec

t = 0.088 sec

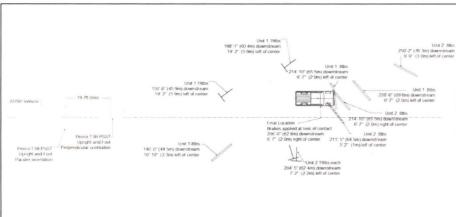
t = 0.132 sec

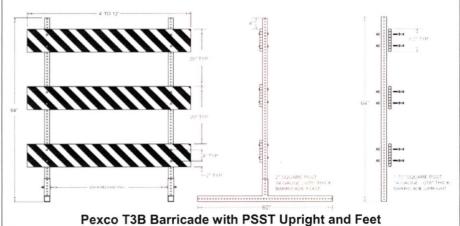
t = 0.000 sec

t = 0.093 sec

t = 0.186 sec

t = 0.325 sec





#### **General Information**

Test Agency	E-TECH Testing Services
Test Designation	MASH Test 3-72
Test No	81-0462-002
Date	6/27/2017

Test Article	
Type	Pexco
	12 m wide T3B Barricade with
	PSST Upright and Feet
	Work-Zone Traffic Control Device
Dimensions	1.63 m OA Height x 3.66 m Wide
Installation Details	Three horizontal panels measuring 1.52 m,
	1.02 m and 0.51 m high (Top of Panel to Grade)
Material and Key	27.2 kg Complete, PSST Upright and Feet with
Elements	(3) 3.66 m wide HDPE Panels with Reflective
	Sheeting
Foundation Type and Condition	Asphalt, clean and dry

#### Test Vehicle

Type	Production Model
Designation	
Model	2011 Dodge Ram 1500
Curb	
Test Inertial	2252.0 kg
Dummy	N/A
Gross Static	

#### Impact Conditions

Speed (Normal Orientation)	.101.4 kph
Speed (Perpendicular Orientation)	.100.8 kph
Impact Severity (Normal Orientation).	.892.6 kJ
Impact Severity (Perp. Orientation)	.882.8 kJ

#### **Exit Conditions**

Speed (Normal Orientation)	100.8	kph
Speed (Perpendicular Orientation)	100.1	kph
Angle (deg)	0	

#### Vehicle Damage

Exterior	
VDS	FC-0 (negligible)
CDC	12FCLW0 (negligible)

#### Occupant Compartment Deformation Windshield ......N/A All other areas ......N/A

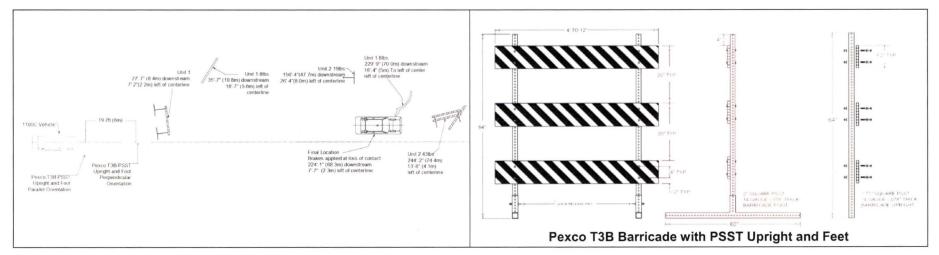
Figure 7 - Summary of Results - Pexco T3B Barricade with PSST Upright and Feet Test 81-0462-002



#### Normal (0 deg) Orientation

#### Perpendicular (90 deg) Orientation





General Information           Test Agency         E-TECH Testing Services           Test Designation         MASH Test 3-71           Test No         81-0462-001           Date         6/27/2017	Test Vehicle           Type         Production Model           Designation         1100C           Model         2011 Hyundai Accent           Curb         1097.0 kg	Vehicle Damage Exterior VDS CDC
Test Article TypePexco	Test Inertial	Occupant Compartment Windshield All other areas
12 m wide T3B Barricade with PSST Upright and Feet Work-Zone Traffic Control Device Dimensions	Impact Conditions Speed (Normal Orientation)100.8 kph Speed (Perpendicular Orientation)98.3 kph Impact Severity (Normal Orientation)434.0 kJ Impact Severity (Perp. Orientation)412.7 kJ	
Material and Key	Exit Conditions Speed (Normal Orientation)	

Figure 2 - Summary of Results - Pexco T3B Barricade with PSST Upright and Feet Test 81-0462-001

....FC-0 (negligible) ....12FCLW0 (negligible)

.....Negligible



#### **APPENDICES**

Appendix A - Details of Test Article

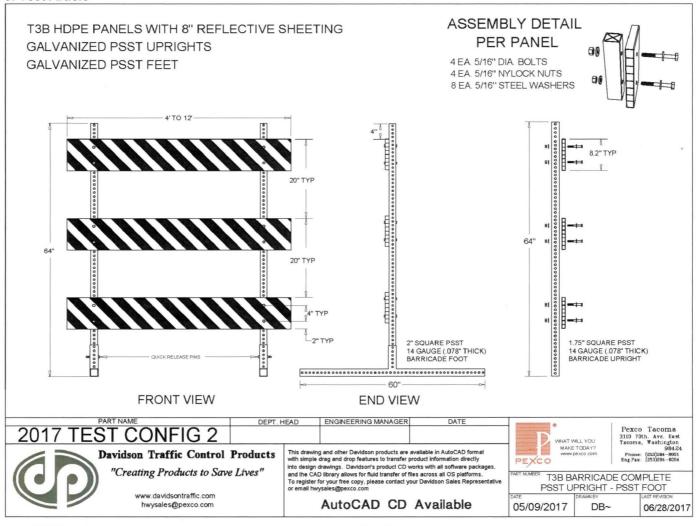


Illustration 1 - Pexco T3B Barricade with PSST Upright and Feet Technical Drawing

#### Yassin, Menna (FHWA)

From:

Craig Schulz < Craig. Schulz@pexco.com>

Sent:

Tuesday, March 19, 2019 10:48 AM

To:

Yassin, Menna (FHWA)

Subject:

RE: Data not visible on form

Importance:

High

Hello Menna,

This is your form how can I add to it, I have no edit or author authorities?

Here is the complete text copied out of the forms you just sent back pasted in this email.

## PSST Upright and Footing: 3-71 (1100C)

E-TECH Test 81-0462-001 Test Date: 6-27-2017

Per MASH, the test article is to be impacted on the critical impact point (CIP) at the critical impact angle (CIA) with an impacting 1100C vehicle at 100 km/hr. The orientations chosen were to impact the test article at 0 and 90 degrees. The purpose of this test was to analyze the Pexco T3B Barricade with PSST Upright and Feet work-zone traffic control device's interaction with a MASH specified 1100C test vehicle and report the interactions between the test article and test vehicle. The test was run using a grey primer over blue 2011 Hyundai Accent sedan.

For the 0 deg test article, the 1100C vehicle's front bumper first impacted the lower HDPE panel of the test article. As the lower panel began to wrap around the vehicles bumper and the vertical uprights began to twist, the bottom of the middle panel contacted the vehicle's hood. The lower panel detached from the rest of the test article and remained wrapped around the vehicle's front bumper, fenders, front wheels and front doors. As the middle panel slid up the hood, it wrapped around the lower windshield and A-pillars and broke off the passenger door mirror. The test article then slid up the vehicle's hood and windshield slightly elevating the test article off the ground. The middle panel detached from the uprights and elevated above the vehicle. The bottom of top panel contacted the vehicle's roof and slid over the top of the vehicle slightly elevating the panel, with uprights still attached, above the vehicle. As the vehicle passed under the test article, the feet twisted towards the test vehicle. The passenger rear tire was struck by the edge of the foot causing a fast leak (i.e. not a blowout). The top panel with uprights came to rest behind the test vehicle and remained attached.

For the 90 deg test article, the 1100C vehicle's front bumper first impacted the cantilevered lower HDPE panel of the test article. The lower panel was pushed forward then buckled as the uprights began to deform. The lower corner of the middle panel then contacted the test vehicle's hood and buckled as it slid up towards the windshield. The lower corner of the upper panel initially contacted the vehicle's windshield but did not result in any cracking or deformation. The entire test article remained forward of the windshield and continued to push forward. Pieces of the test article began to separate as the vehicle came to rest.

No portion of the test articles engaged

the undercarriage of the vehicle thus there was no notable damage to the undercarriage of the test vehicle (i.e. floor pan, foot well, oil pan, gas tank, trunk, etc.).

The test vehicle sustained negligible damage to the front bumper, hood and roof. As the ends of the barricade (0 deg orientation only) wrapped around the front end of the car, it contacted the passenger mirror which partially

detached. There was no cracking or deformation on the windshield. The damage to the test vehicle was categorized as FC-0 (negligible) on the Vehicle Damage Index and as 12FCLW0 (negligible) on the Collision Deformation Classification Scale along the principal direction of force. There was negligible deformation to the occupant compartment based upon pre and post-test measurements. The Vehicle Compartment Deformation Index (VCDI) was categorized as AS0000000 as there was no measurable or visual deformation of the occupant compartment.

#### 3-72 (2270P)

-TECH Test 81-0462-002 Test Date: 6-27-2017

Per MASH, the test article is to be impacted on the critical impact point (CIP) at the critical impact angle (CIA) with an impacting 2270P vehicle at 100 km/hr. The orientations chosen were to impact the test article at 0 and 90 degrees. Both

test articles

were spaced 6 m apart.

The purpose of this test was to analyze the Pexco T3B Barricade with PSST Upright and Feet work-zone traffic control device's interaction with a MASH specified 2270P test vehicle and report the interactions between the test article and test vehicle. The test was run using a silver 2011 Dodge Ram 1500 Quad Cab pickup truck. The barricades were not fitted with any optional accessories.

For the 0 deg test article, the 2270P vehicle's front bumper first impacted the lower HDPE panel of the test article and the grill impacted the middle panel. As both the lower and middle panels began to wrap around the front of the vehicle, they detached from the uprights and remained on the front of the vehicle from most of the impact event.

For the 90 deg test article, the 2270P vehicle's front bumper and grill first impacted the cantilevered lower and middle HDPE panels of the test article respectively. As the lower and middle panels began to buckle, the first upright with foot was pushed ahead of the vehicle. The test article remained forward of the occupant compartment for the duration of the impact event.

No portion of the test articles engaged the undercarriage of the vehicle thus there was no notable damage to the undercarriage of the test vehicle (i.e. floor pan, foot well, oil pan, gas tank, trunk, etc.).

The test vehicle sustained negligible damage to the front bumper, hood and roof. The front plastic grill was damaged and slightly displaced. As the 0 degree test article wrapped around the front end of the vehicle, the upright on the passenger side contacted the passenger side mirror and a portion of the mirror detached. There was no damage to the windshield. The damage to the test vehicle was categorized as FC-0 (negligible) on the Vehicle Damage Index and as 12FCLW0 (negligible) on the Collision Deformation Classification Scale along the principal direction of force. There was negligible deformation to the occupant compartment based upon pre and post-test measurements. The Vehicle Compartment Deformation Index (VCDI) was categorized as AS0000000 as there was no measurable or visual deformation of the occupant compartment.

Craig Schulz | Pexco LLC Global Sales / Product Line Manager - Traffic 3110 70<sup>th</sup> Ave East | Tacoma, WA 98424

Office: (253) 284-8005 | Cell: (253) 886-7171 | Fax: (253) 284-8080

Email: <a href="mailto:craig.schulz@pexco.com">craig.schulz@pexco.com</a> Visit us at: <a href="mailto:www.pexco.com">www.pexco.com</a>

From: Yassin, Menna (FHWA) <menna.yassin@dot.gov>

Sent: Tuesday, March 19, 2019 7:33 AM
To: Craig Schulz < Craig. Schulz@pexco.com>

Subject: Data not visible on form

Hello Mr. Schulz,

We are in the final stage of review for the X-Tube and the PSST barrier, but unfortunately there is an issue with the eligibility form information, the text is not visible on some of the pages. Would you be able to send me another form for both devices that includes the remaining text (you can copy and past the invisible text to another page). As of now the text is being cut off (page 4 is blank) for test 3-71 and for test 3-72 also has missing text. Examples below. I've attached the versions of the forms I have.

	The entire test article remained forward of the windshield and continued to push forward. Pieces of the test article began to separate as the vehicle came to rest.	
		Version 10.0 (05/16) Page 4 of 6
	measurements. The Vehicle Compartment Deformation Index (VCDI) was categorized as AS0000000 as there was no measurable or visual deformation of the occupant compartment.	
		Version 10.0 (05/16) Page 6 of 6
Full Scale C	rash Testing was done in compliance with MASH by the foll	owing accredited crash test

Sincerely,
Menna Yassin, PE
Highway Safety Engineer | Safety Design Team
USDOT, Federal Highway Administration | Office of Safety
1200 New Jersey Avenue, SE
Washington, DC 20590
Phone: 202-366-2833

Email: Menna. Yassin@dot.gov



U.S. Department of Transportation Federal Highway Administration