U.S. Department of Transportation
Federal Highway Administration

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

May 24, 2012

In Reply Refer To:
WZ-318

Kenneth Parrott
Impact Recovery Systems, Inc.
4955 Stout Dr.
San Antonio, Texas 78219

Dear Mr. Parrott:

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:	Tuff Curb©
Type of system:	Channelizing curb system
Test Level:	MASH Test Level 3
Testing conducted by:	Texas Transportation Institute
Date of request:	August 10, 2011

Decision:
The following device is eligible, with details provided below and in the form which is attached as an integral part of this letter:

- Tuff Curb channelizing curb system.

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).

FHWA: HSST: NArtimovicht: sf: x61331:5/17/12
File: s: //directory folder/HSST/Artimovich/WZ318_IRS_TuffCurb.docx
cc: HSST (NArtimovich; JDewar)

Description
Tuff Curb® is a longitudinal channelizing curb system produced by Impact Recovery Systems, Inc. Tuff Curb® is an injection molded high-density polyethylene curb made up of two halves, each measuring 12 inches wide by 3 ½ inches tall by 20 inches long. The curb halves interlock and are connected with two 7/16-inch x 1 ½-inch bolts. Each curb section measures 40 inches long and is anchored with two ½-inch x 4-inch concrete screw anchors or two 5/8-inch x 5-inch plastic sleeve anchors placed into the roadway. The Tuff Curb® installation begins and ends with a nose end section that measures 12 inches wide by 3 ½ inches tall by 18 inches long at the mating end and is 1 ¾ inches tall at the exposed end. Each section is anchored by three of the above described anchors. Tubular delineators with or without attached signage are attached to the center section of the curb. It should be noted that all tests were conducted with vertical road tubes in place.

Eight crash tests were successfully conducted on January 19, 2011 at Texas Transportation Institute in accordance with MASH 3-90 and 3-91. Four tests were conducted twice, once each with an 1100C small car and 2270P pickup truck. These tests and their results were as follows:
1. Traversal of Curb at 25° - Pass – Vehicle stable and no compartment penetration or deformation.
2. Traversal of Vee - Pass – Vehicle stable and no compartment penetration or deformation
3. Traversal of Curb at 0° - Pass – Vehicle stable and no compartment penetration or deformation
4. Lane change maneuver across straight curb section - Pass – Vehicle stable and no compartment penetration or deformation.

Summary and Standard Provisions
Therefore, the system described above 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 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 WZ-318 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.
- The Tuff Curb© 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,

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

Enclosures

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of Transportation
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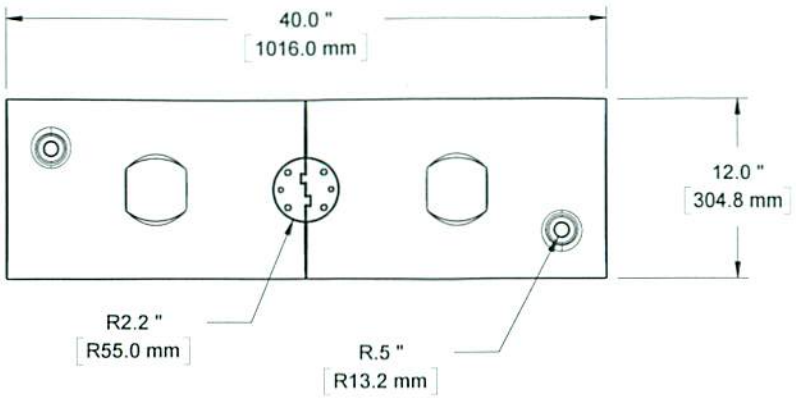
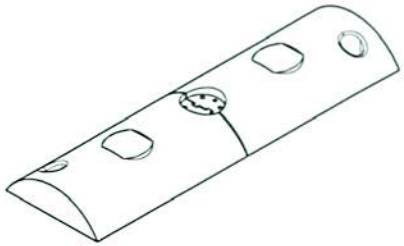
Sincerely yours,

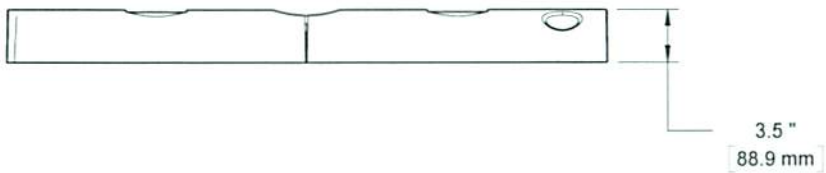
Michael S. Griffith

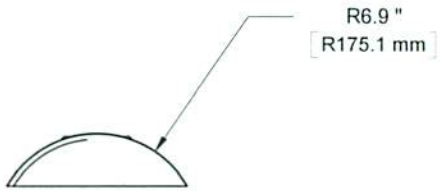
Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

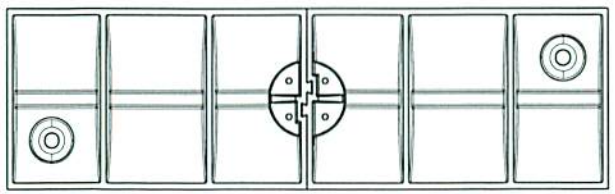
Enclosures











MANUFACTURING INFORMATION

1. INJECTION MOLDED
2. UV STABILIZED HDPE
3. COLORS: WHITE, YELLOW, CUSTOM

INTENDED USE

1. FOR USE AS A TEMPORARY OR PERMANENT LONGITUDINAL CHANNELIZING CURBING SYSTEM ON ROADS, HIGHWAYS, AND PARKING LOTS.
2. CRASHWORTHINESS TESTED TO 2009 M.A.S.H. STANDARDS.
3. INSTALL USING 1/2" X 4" CONCRETE SCREW ANCHORS OR 5/8" X 5" PLASTIC SLEEVE ANCHORS.

IMPACT recovery SYSTEMS
"Performance for a Safer Tomorrow"

4955 STOUT DR. · SAN ANTONIO, TX 78219 · (800) 736-5256

SIZE	PART NO.	DWG.	REV
A		TUFF CURB ASSEMBLY	A
SCALE	IMPACT RECOVERY SYSTEMS, INC.	DATE 08-AUG-2011	

Attachment 1

Page 1	**FEDERAL HIGHWAY ADMINISTRATION** **OFFICE OF SAFETY DESIGN** **Category 2 Work Zone Device Acceptance Letter**	Letter Number Date 08/10/2011
Contact Info	Petitioner / Developer Name and Address: Impact Recovery Systems, Inc. c/o Kenneth Parrott 4955 Stout Dr. San Antonio, TX 78219	
	I herby certify that the device(s) covered by this Acceptance Letter meet(s) the crash – worthiness test and evaluation requirements of the FHWA and NCHRP Report 350.	
Signature	Kenneth A Parrott	
Telephone #	(800) 736-5256	
Email Address	kparrott@impactrecovery.com	
	Laboratory / Engineer Name and Address Texas Transportation Institute The Texas A&M University - 3135 TAMU College Station, TX 77843-3135	
☑	I hereby certify that the testing that supports this Acceptance Letter was conducted in accordance with ~~NCHRP Report 350~~ guidelines, that the device(s) tested is/are accurately described on this form, and that the test results indicate that the device meets all applicable ~~NCHRP Report 350~~ evaluation criteria.	* 2009 MASH
☐	I have evaluated the requested modifications to these devices previously found acceptable by the FHWA in Acceptance Letter WZ-___, and hereby certify that, in my opinion, the modifications do not adversely affect the crash performance of the devices. I also certify that these devices are accurately described on this form.	* 2009 MASH
Signature	Kenneth A Parrott	
Telephone #	(800) 736-5256	
Email Address	kparrott@impactrecovery.com	
Keywords:		
	Type of Device (See page 3) Longitudinal Channelizing Barricade Curb (Curb channelizer system with or without road	
	Composition of Sign or Rail substrate (See Page 3)	
	Thickness of substrate (inches):	
	Height of sign from the ground (inches), if applicable: (See Page 3)	
	Flags and or lights present during test? Indicate number of each: # of flags: # of lights: Weight of lights: ea.	
Device Name	Tuff Curb	
Detailed Desc. Of Device, Materials, sizes, Fasteners, Substrates Foundation, Aux. Features Ballast, etc.	(May be attached on separate page(s) See Attached.	

Detailed desc. of device, materials, sizes, fasteners, substrates, foundation, aux. features, ballasts, etc.	Tuff Curb® is a longitudinal channelizing curb system produced by Impact Recovery Systems, Inc. Tuff Curb® is an injection molded HDPE curb made up of two halves, each measuring 12" wide by 3 ½" tall by 20" long. The curb halves interlock and are connected with two 7/16" x 1 ½" bolts. Each curb section measures 40" long and is anchored with two ½" x 4" concrete screw anchors or two 5/8" x 5" plastic sleeve anchors placed into the roadway. The Tuff Curb® installation begins and ends with a nose end section that measures 12" wide by 3 ½" tall by 18" long at the mating end and is 1 ¾" tall at the exposed end. Each section is anchored by three of the above described anchors. Tubular delineators with or without attached signage are attached to the center section of the curb.

Page 2	**FEDERAL HIGHWAY ADMINISTRATION** **OFFICE OF SAFETY DESIGN** **Category 2 Work Zone Device Acceptance Letter**		Letter Number Date 08/10/2011
	Mandatory Attachments		
	Attachment # 1: Test data summary page(s)		
	Attach. #1a	Test # IRS6 1-8	
	Attach. #1b	Test #	
	Attach. #1c	Test #	
	Attach. #1d	Test #	
Alternative	**Attachment # 1:** Description and discussion of modification(s) to crash tested and/or accepted device.		
	Date:		
	Attachment # 2: PDF drawing(s) of device(s)		
	Attach. #2a	Drawing Title: Tuff Curb Assembly	
		Drawing #:	
	Attach. #2b	Drawing Title:	
		Drawing #:	
	Attach. #2c	Drawing Title:	
		Drawing #:	
	Attach. #2d	Drawing Title:	
		Drawing #:	
	Attach. #2e	Drawing Title:	
		Drawing #:	
	Attach. #2f	Drawing Title:	
		Drawing #:	
	Attach. #2g	Drawing Title:	
		Drawing #:	

Page 3	FEDERAL HIGHWAY ADMINISTRATION OFFICE OF SAFETY DESIGN Category 2 Work Zone Device Acceptance Letter	Letter Number Date 08/10/2011

Please select from the following Keywords for "Type of Device":

Longitudinal Channelizing Barricade
Curb (Curb channelizer system with or without road tubes or other channelizers)
Drum
H-Footprint Sign Stand
X-Footprint Sign Stand
Trailer Mounted Signs (Does not include arrow boards or variable message signs or other Category 4 trailer mounted devices.)
Automated Flagger Device (not trailer mounted)
Tripod Sign Stand
Type I Barricade
Type II Barricade
Type III Barricade
Vertical Panel
Intrusion Detector
Ballast (Action relates to ballast on one or more devices)
Channelizer (Individual units unlike cones, road tubes, or drums)

Please select from the following Keywords for "Sign Substrate":

Roll-up / Fabric (with fiberglass spreaders – aluminum or steel spreaders are not allowed.)
Plywood
Aluminum – Solid
Aluminum – Laminate
Corrugated Plastic
Extruded Plastic
Waffleboard Plastic
Wood / Lumber

Please select from the following Keywords for "Height of Sign":

The distance to the lowest point on the sign is:

Low	12 to 18 inches above the pavement
Mid-A	20 to 24 inches above the pavement
Mid-B	25 to 36 inches above the pavement
Mid-C	37 to 59 inches above the pavement
Tall	60 to 71 inches above the pavement
Oversized	72 inches and taller

Page 4	FEDERAL HIGHWAY ADMINISTRATION OFFICE OF SAFETY DESIGN Category 2 Work Zone Device Acceptance Letter	Letter Number
		Date

Please note the following standard provisions that apply to FHWA letters of acceptance:

- Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, or conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- If the subject of this letter is a patented device it is considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are *selected by the contractor* for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are *specified by a highway agency* for use on Federal-aid projects they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with 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, a copy of which is enclosed.
- This Acceptance Letter shall not be construed as authorization or consent by the Federal Highway Administration to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The Acceptance Letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

CLRS – Where do we start?

Table 38: Head-On and Sideswipe, Opposite Direction Crashes – Undivided State Roads - ≥ 22 Feet Road Width - 2004-2008

LOCALITY	TOTAL CRASHES	TOTAL FATALITIES	TOTAL INCAPACITATING CRASHES	FATALITIES PER 100 CRASHES	INCAPACITATING CRASHES PER 100 CRASHES
Rural	2,359	224	257	9.50	10.89
Urban	1,423	27	93	1.90	6.54
Total	**3,782**	**251**	**350**	**6.64**	**9.25**

Table 39: Head-On and Sideswipe, Opposite Direction Crashes – Undivided State Rural Roads - ≥ 22 Feet Road Width - 2004-2008 - Summary

NUMBER OF CRASHES PER SECTION	NUMBER OF SECTIONS (15,000 FT)	CUMULATIVE SECTIONS	CUMULATIVE PERCENT	CUMULATIVE CRASHES	CUMULATIVE PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	-	-	0.00%	-	0.00%
10 - 19	13	13	1.28%	149	6.32%
5 - 9	82	95	9.32%	652	27.64%
4	86	181	17.76%	996	42.22%
3	137	318	31.21%	1,407	59.64%
2	251	569	55.84%	1,909	80.92%
1	450	1,019	100.00%	2,359	100.00%
Total	**1,019**	**1,019**	**100.00%**	**2,359**	**100.00%**

Table 40: Head-On and Sideswipe, Opposite Direction Crashes – Undivided State Urban Roads - ≥ 22 Feet Road Width - 2004-2008 - Summary

NUMBER OF CRASHES PER SECTION	NUMBER OF SECTIONS (15,000 FT)	CUMULATIVE SECTIONS	CUMULATIVE PERCENT	CUMULATIVE CRASHES	CUMULATIVE PERCENT
50 and greater	-	-	0.00%	-	0.00%
30 - 49	-	-	0.00%	-	0.00%
20 - 29	1	1	0.22%	24	1.69%
10 - 19	21	22	4.94%	293	20.59%
5 - 9	70	92	20.67%	742	52.14%
4	35	127	28.54%	882	61.98%
3	70	197	44.27%	1,092	76.74%
2	83	280	62.92%	1,258	88.40%
1	165	445	100.00%	1,423	100.00%
Total	**445**	**445**	**100.00%**	**1,423**	**100.00%**