



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

400 Seventh St., S.W.  
Washington, D.C. 20590

December 6, 2000

Refer to: HSA-1\HSA-CC71

Barry D. Stephens, P.E.  
Senior Vice President - Engineering  
Energy Absorption Systems, Inc.  
3617 Cincinnati Avenue  
Rocklin, CA 95765

Dear Mr. Stephens:

In your October 5 letter, you requested the Federal Highway Administration's review and acceptance of your new EASI-Cell Crash Cushion, a self-restoring version of the original Hi-Dro Cell Cluster. The EASI-Cell was designed to meet the National Cooperative Highway Research Program (NCHRP) Report 350 evaluation criteria for a Test Level 1 (TL-1) device. To support your request, you provided Mr. Richard Powers of my staff a copy of the October 2000 test report entitled "EASI-Cell System Crash Testing to NCHRP 350 Test Level 1, Engineering Summary," which included the E-TECH Testing Services, Inc. report, dated September 2000, entitled "NCHRP Report 350 Crash Test Results for the 3 EASI-Cell System" and a videotape showing the full-scale tests that were conducted.

The EASI-Cell consists of an array of High Density Polyethylene (HDPE) cylinders arranged in eight rows of four columns each, making the unit 1.3-m wide x 2.6-m deep. The individual cylinders have an outside diameter of 324 mm and are 990-mm tall. They are connected to each adjoining cylinder and to a steel backup structure. Each cylinder in the first row has a wall thickness of 19 mm and all the others have wall thicknesses of 10 mm. The unit is designed to be essentially self-restoring after an impact. Enclosure 1 is a schematic drawing of the tested unit.

Since the EASI-Cell is classified as a non-redirective crash cushion, the recommended NCHRP Report 350 test matrix consists of five tests. Four of these tests were run and successfully completed. My staff agreed beforehand that test 1-42 (820-kg vehicle/50 km/h impact speed/15 degree impact angle on the nose) was similar to test 1-40 (820-kg vehicle/50 km/h/head-on impact at vehicle quarter point) and that the latter could be waived if test 1-42 was fully satisfactory, which it was. Enclosure 2 shows the summary results of the four tests that were conducted. As a result of damage to the backup structure in test 1-44, you increased the number of MP-3 anchors from four to seven in the final design. Each anchor is a 19-mm diameter x 178-mm long ASTM A193 Grade B7 stud grouted into a 27.6 MPa unreinforced concrete foundation to a depth of 140 mm. The additional bolts should significantly minimize repairs needed after an impact.

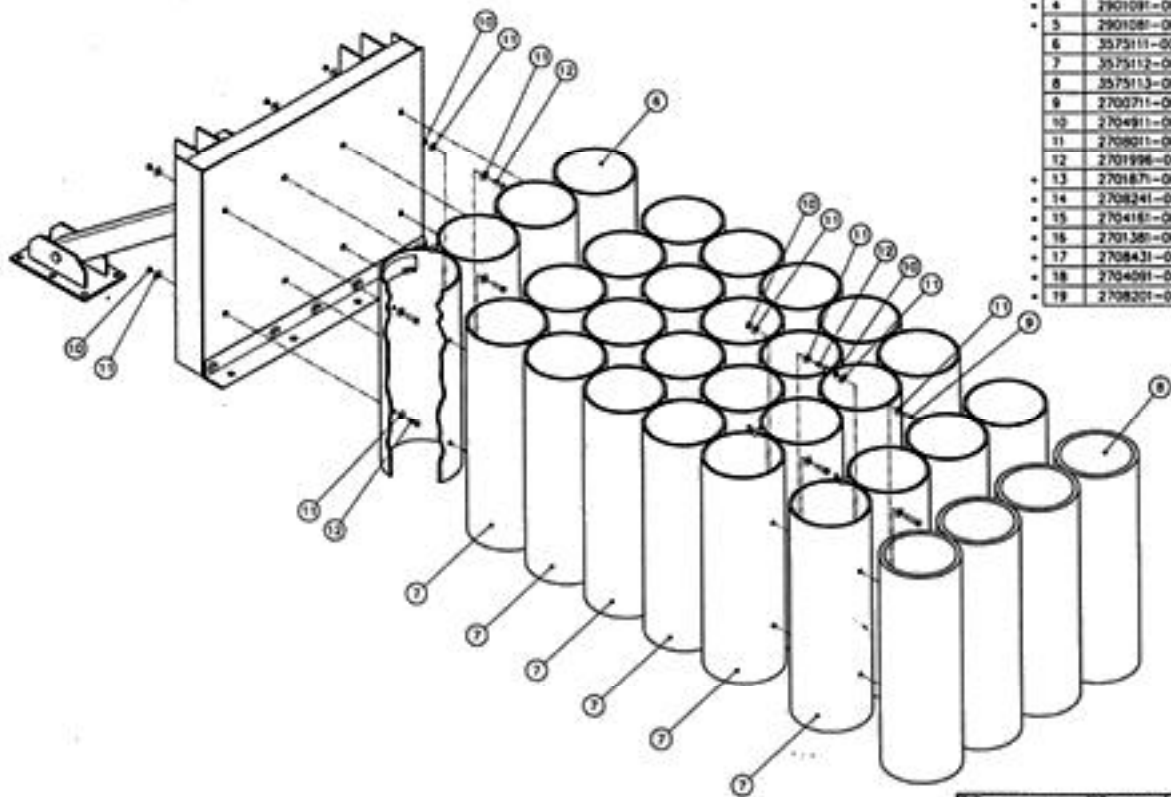
Based on our review of the information you submitted, we agree that the EASI-Cell, when installed as tested, meets the appropriate evaluation criteria for an NCHRP Report 350 TL-1 crash cushion and that this design may be used on the National Highway System (NHS) when a TL-1

device is appropriate and selected by a transportation agency. Since the information you sent us did not include a detailed description of the backup structure components, we would appreciate your providing this information for our files. We assume that you will supply users with the same backup assembly that was tested or one with comparable strength. We noted also that the EASI-Cell is designed to be used at locations where reverse-direction hits are unlikely. If it is installed in a median, an appropriate transition design would be needed to prevent a vehicle from impacting the rear of the backup structure if the unit cannot be offset laterally from the shielded object. Since the EASI-Cell is a proprietary device, its use on Federal-aid projects, except exempt, non-NHS projects, is subject to the conditions listed in Title 23, Code of Federal Regulations, Section 635.411.

Sincerely yours,

Frederick G. Wright, Jr.  
Program Manager, Safety

2 Enclosures


 TOL. ANGULAR: ± 1°  
 TOL. LINEAR: ± 1/16"

 TOL. ANGULAR: ± 1°  
 TOL. LINEAR: ± 1/16"

## PARTS LIST

VIEW	STOCK NO.	DESCRIPTION	QTY
1	2903571-0000	BACKUP DIAGONAL BRACE, 48" EAS-CELL	1.00
2	2903572-0000	FOOT, BACKUP, 48" EAS-CELL	1.00
3	2901071-0000	ADAPTER, DIAG. BRACE, 0	2.00
4	2901081-0000	FOOT, DIAGONAL BRACE, 0	2.00
5	2901081-0000	BRACE, DIAGONAL, 40 G	2.00
6	3575111-0000	CYL. ASSY, 50R 32.5, 12X36, EAS-CELL	1.00
7	3575112-0000	CYL. ASSY, 50R 32.5, 12X36, EAS-CELL	6.00
8	3575113-0000	CYL. ASSY, 50R 17, 12X36, EAS-CELL	1.00
9	2700711-0000	BOLT, HK, 1/2X2 1/2, G5, G	8.00
10	2704911-0000	NUT, HK, 1/2, G5, G	64.0
11	2708011-0000	WASHER, FLAT, 1/2X1 3/8, G	128
12	2701998-0000	BOLT, HK, 1/2X1 3/4, G5, G	56.0
13	2701871-0000	BOLT, HK, 1/8 X 1/2, G2, G	4.00
14	2708241-0000	WASHER, LOCK, 1, G	4.00
15	2704161-0000	NUT, HK, 1, G	4.00
16	2701381-0000	BOLT, HK, 3/4X2, G2, G	13.0
17	2708431-0000	WASHER, FLAT, 3/4 X 1 1/2, G	28.0
18	2704091-0000	NUT, HK, 3/4, G	13.0
19	2708201-0000	WASHER, LOCK, 3/4, G	13.0

SEE SHEET 2

D. Kohfeld	8/28/00
JW	6/19/00
JMC	9/14/00
LCC	9/14/00
S. Trogeer	9/15/00
408101.dwg	

ENERGY ABSORPTION SYSTEMS, INC.  
ENGINEERING AND RESEARCH DEPARTMENT

EASI-Cell™ ASSEMBLY

NTS

40-61-01

1 of 2

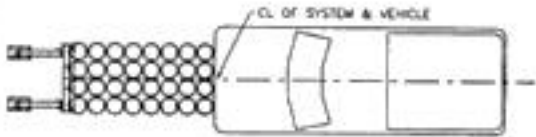
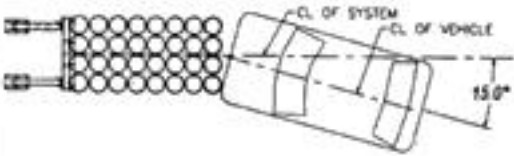
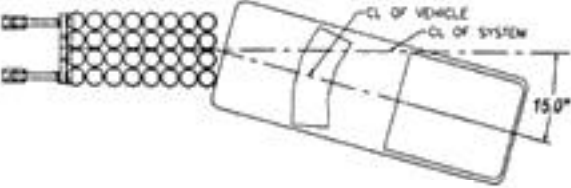
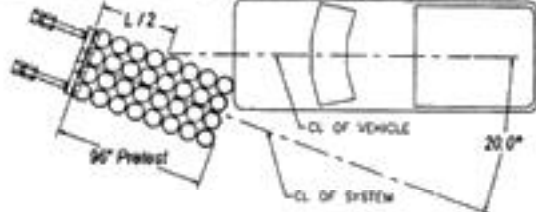
NCHRP 350 Test	Test Results	Comments
 <p>Test 1-41, 2000P / 50kph / 0°</p>	<p>Long. Delta V = 7.8 m/s            Lateral Delta V = 0.0 m/s            Long. Ridedown = -11.8 g            Lateral Ridedown = -2.0 g</p>	<p>Occupant risk values within Preferred limits specified in NCHRP 350.</p>
 <p>Test 1-42, 820C/50kph/15° nose.</p>	<p>Long. Delta V = 7.6 m/s            Lateral Delta V = 0.5 m/s            Long. Ridedown = -8.4 g            Lateral Ridedown = 1.8 g</p>	<p>Occupant risk values within Preferred limits specified in NCHRP 350.</p>
 <p>Test 1-43, 2000P/50kph/15° nose.</p>	<p>Long. Delta V = 7.6 m/s            Lateral Delta V = 0.9 m/s            Long. Ridedown = -12.1 g            Lateral Ridedown = 3.0 g</p>	<p>Occupant risk values within Preferred limits specified in NCHRP 350.</p>
 <p>Test 1-44, 2000P/50kph/20° CIP</p>	<p>Long. Delta V = 7.4 m/s            Lateral Delta V = -0.2 m/s            Long. Ridedown = -12.7 g            Lateral Ridedown = -2.8 g</p>	<p>Occupant risk values within Preferred limits specified in NCHRP 350. (Note – Occupant risk values not required evaluation criteria for Test x-44.)</p>

Table 1. EASI-Cell™ System Crash Test Summary