

July 11,2002

Refer to: HSA-10/CC78

Barry D. Stephens, P.E.
Senior Vice President, Engineering
ENERGY ABSORPTION Systems, Inc.
03617 Cincinnati Avenue
Rocklin, CA 95765

Dear Mr. Stephens:

Your June 10 letter was delivered to Mr. Richard Powers of my staff on July 3 by Mr. Douglas Bernard. In that letter, you requested the Federal Highway Administration's (FHWA) acceptance of a re-designed truck mounted attenuator (TMA) called the Safe-Stop 180 TMA for use on Federal-aid projects as an National Cooperative Highway Research Program (NCHRP) Report 350 Test Level 3 (TL-3) device. To support your request, you provided copies of a June 2002 report by E-TECH Testing Services, Inc., entitled "NCHRP Report 350 Crash Test Results for the Safe-Stop 180 TMA." This report contained data on the NCHRP Report tests 3-50 and 3-51, which are the basic tests required for acceptance of a TMA. Optional TMA tests 3-52 and 3-53 were not run on this new version of the Safe-Stop.

The Safe-Stop 180 is 4190-mm long, 2360-mm wide at the impact face, and weighs approximately 945 kilograms. Unlike the original Safe-Stop which had a transport height of over 13 feet when in the raised position, the Safe-Stop 180 TMA consists of a bi-folding articulating frame assembly that contains a Safe-Stop Type A Cartridge immediately behind the impact face and a Safe-Stop Type B Cartridge near the support vehicle. The Type A and B cartridges are similar in internal design to the Type 1 and Type 2 cartridges used with the original Safe-Stop, but are wider. When the rearmost frame containing the Type A cartridge is pivoted 180 degrees vertically and folded on top of the front frame containing the Type B cartridge for transport, the unit is only 6'-8" high. A schematic drawing of the Safe-Stop 180 is included with this letter as Enclosure 1.

Enclosure 2 includes summary data on the two tests that were run. In both tests, the support vehicle weight was 8550 kg. This vehicle was blocked to prevent forward movement in the small car test, and rolled forward 6.9 m after impact by the pickup truck. The ridedown acceleration for the driver of the support vehicle in test 3-51 was not noted in the test report.

Based on the information you provided and staff analysis of the data, we agree that the Safe-Stop 180 TMA, as designed and tested, meets the appropriate crash evaluation criteria suggested in NCHRP Report 350 for a TL-3 truck-mounted attenuator. It may be used on the National Highway System (NHS) when such use is requested by a State transportation agency. As with all TMAs, this acceptance is based on its reported crash test performance and is not intended to address other factors such as durability, the mobility of the support vehicle, road-induced vibrations, maintainability, or the influence of moisture and temperature variations. Since it is a proprietary product, its use on the NHS

is subject to the provisions of Title 23, Code of Federal Regulations, Section 635.411 when such use is specified by the contracting agency.

Sincerely yours,

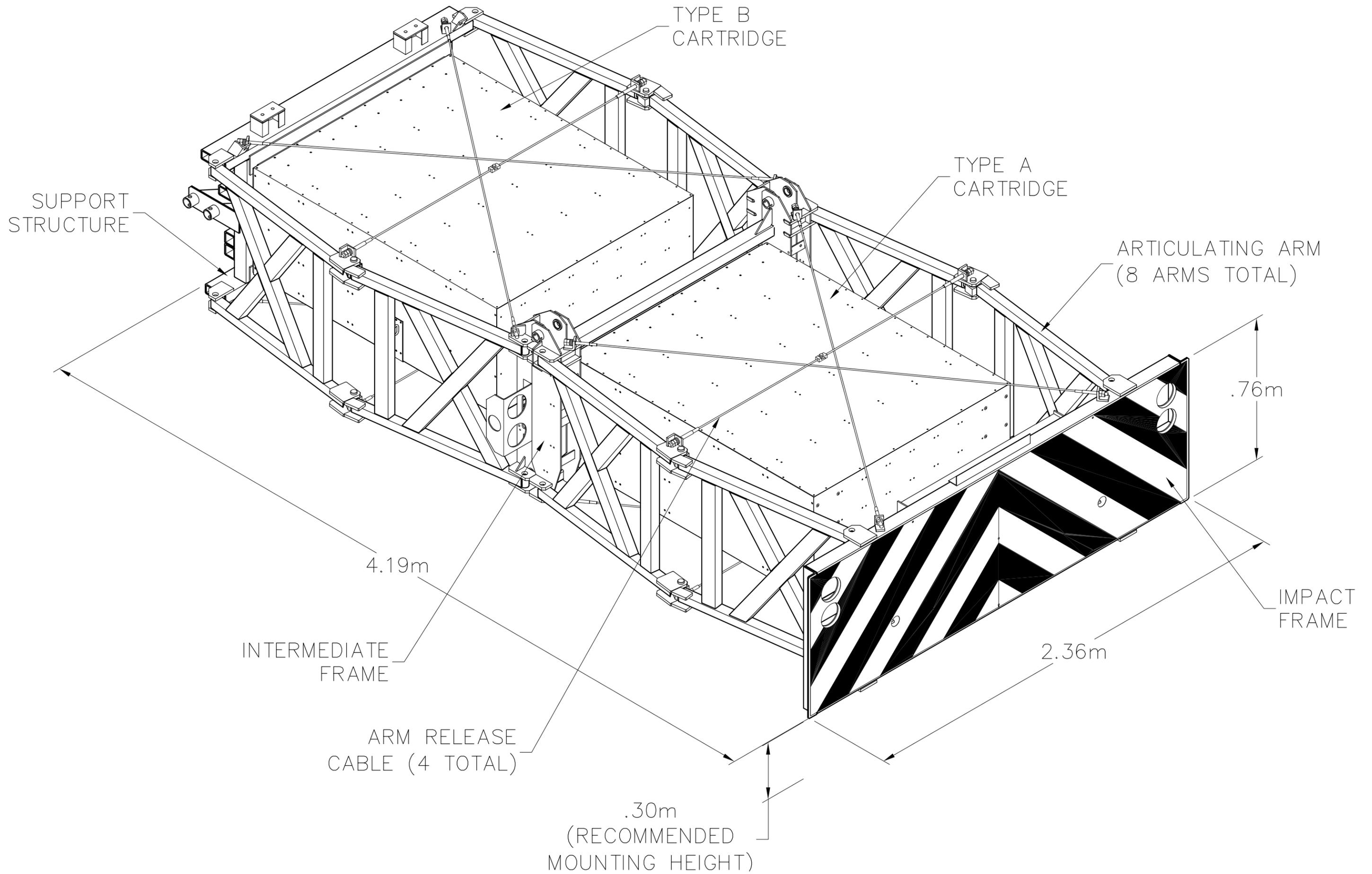
(original signed by Harry W. Taylor)

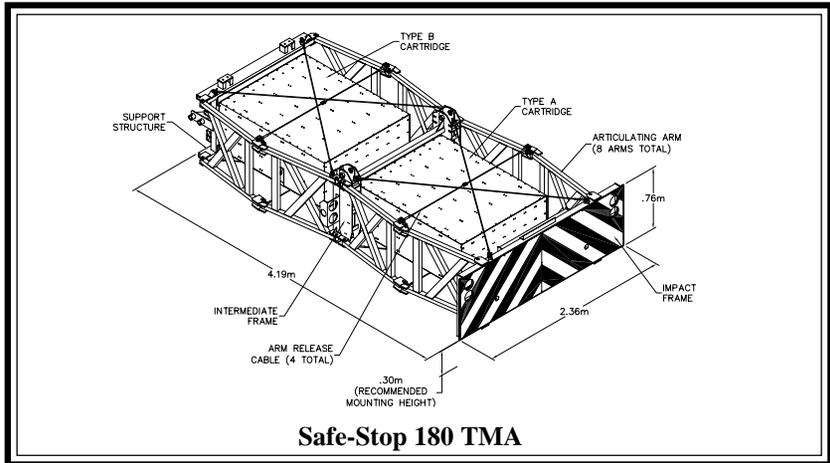
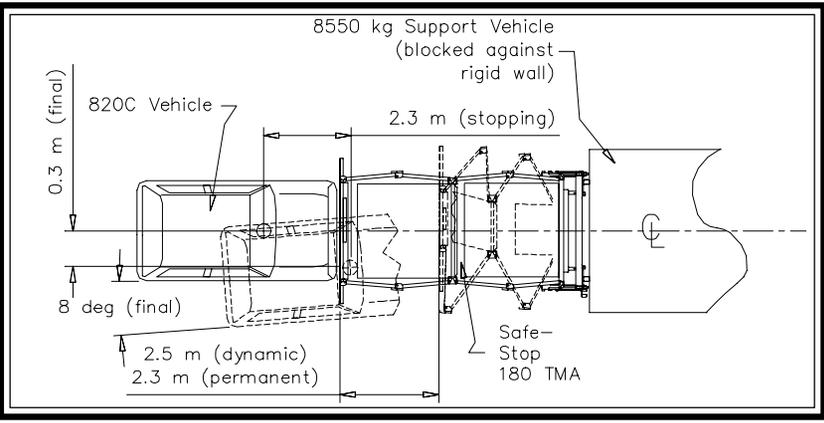
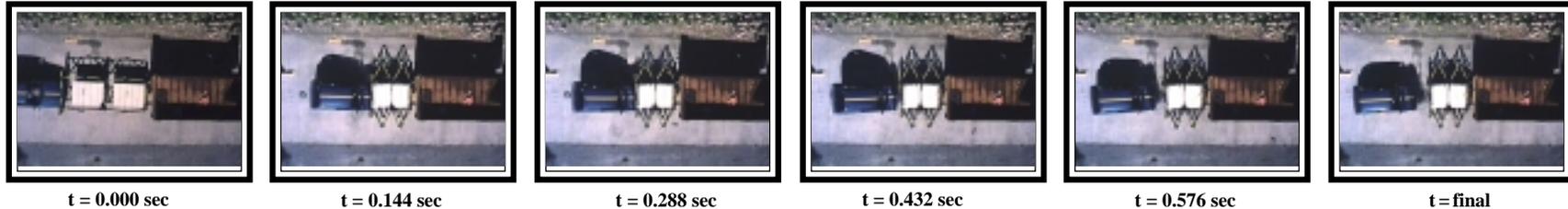
for

Carol H. Jacoby, P.E.

Director, Office of Safety Design

2 Enclosures





E-TECH Testing Services, Inc.

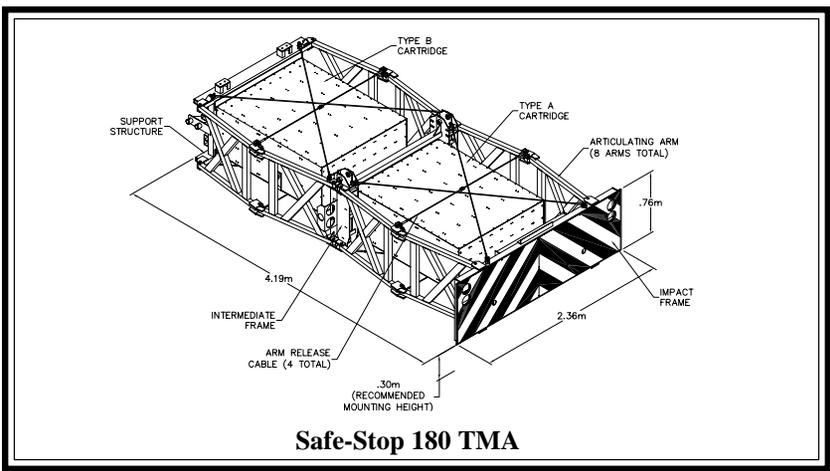
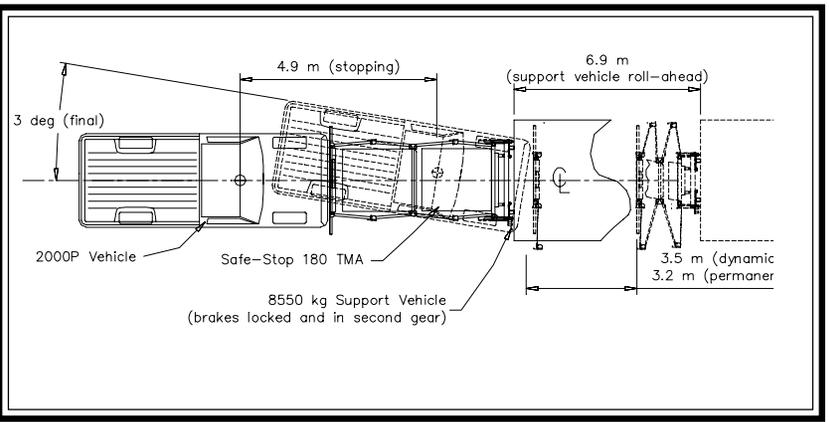
Safe-Stop 180 TMA Crash Test Results - 10 of 43

General Information

Test Agency	E-TECH Testing Services, Inc.
Test Designation	NCHRP 350 Test 3-50
Test No.	01-4307-001
Date	5/30/02
Test Article	
Type	Energy Absorption Systems, Inc.
.....	Safe-Stop 180 TMA™
Installation Length, (mm)	4191 (overall system)
Material and key elements	(2) Aluminum Cartridges; LxHxW
.....	1524 mm x 572 mm x 1219 mm
Foundation Type and Condition	Asphalt, clean and dry
Test Vehicle	
Type	Production Model
Designation	820C Small Car
Model	1993 Ford Festiva
Mass (kg)	
Curb	837
Test inertial	835
Dummy	75
Gross Static	910
Impact Conditions	
Speed (km/h)	99.0
Angle (deg)	0
Impact Severity (kJ)	315.3

Exit conditions	
Speed (km/h)	N/A
Angle (deg)	N/A
Occupant Risk Values	
Impact Velocity (m/s)	
x-direction	11.2
y-direction	0.4
Ridedown Acceleration (g's)	
x-direction	-17.1
y-direction	-4.2
European Committee for Normalization (CEN) Values	
THIV (km/h)	40.3
PHD (g's)	17.1
ASI	1.9
Test Article Deflections (m)	
Dynamic	2.5
Permanent	2.3
Vehicle Damage	
Exterior	
VDS	FD-6
CDC	12FDEW5
Interior	
OCDI	AS0000000
Post-Impact Vehicular Behavior (deg - rate gyro)	
Maximum Roll Angle	2.2
Maximum Pitch Angle	-18.1
Maximum Yaw Angle	-7.8

Figure 1. Summary of Results - Safe-Stop 180 TMA Test 01-4307-001



E-TECH Testing Services, Inc.

General Information

Test Agency	E-TECH Testing Services, Inc.
Test Designation	NCHRP 350 Test 3-51
Test No.	01-4307-002
Date	4/2/02
Test Article	
Type	Energy Absorption Systems, Inc.
.....	Safe-Stop 180 TMA™
Installation Length, (mm)	4191 (overall system)
Material and key elements	(2) Aluminum Cartridges; LxHxW
.....	1524 mm x 572 mm x 1219 mm
Foundation Type and Condition	Asphalt, clean and dry
Test Vehicle	
Type	Production Model
Designation	2000P Pickup
Model	1992 GMC C-2500
Mass (kg)	
Curb	2084
Test inertial	2040
Dummy	N/A
Gross Static	2040
Impact Conditions	
Speed (km/h)	99.0
Angle (deg)	0
Impact Severity (kJ)	771.2

Exit conditions	
Speed (km/h)	N/A
Angle (deg)	N/A
Occupant Risk Values	
Impact Velocity (m/s)	
x-direction	8.7
y-direction	0.2
Ridedown Acceleration (g's)	
x-direction	-19.8
y-direction	-5.1
European Committee for Normalization (CEN) Values	
THIV (km/h)	31.4
PHD (g's)	19.8
ASI	1.3
Test Article Deflections (m)	
Dynamic	3.5
Permanent	3.2
Vehicle Damage	
Exterior	
VDS	FD-6
CDC	12FDEW5
Interior	
OCDI	AS0000000
Post-Impact Vehicular Behavior (deg - rate gyro)	
Maximum Roll Angle	-2.0
Maximum Pitch Angle	-5.2
Maximum Yaw Angle	2.7

Figure 6. Summary of Results - Safe-Stop 180 TMA Test 01-4307-002