



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

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

September 18, 2009

In Reply Refer To:  
HSSD/B-195

Mr. Barry D. Stephens  
Sr. Vice President Engineering  
Energy Absorption Systems, Inc.  
3617 Cincinnati Avenue  
Rocklin, CA 95765

Dear Mr. Stephens:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system: SSG<sup>TM</sup>-200 (also called the SS K-12 Soft Stop<sup>®</sup>) Manufacturer:  
Energy Absorption Systems, Inc. (EASI)  
Type of system: Security Barrier  
Test Level: NCHRP Report 350 TL-2  
Testing conducted by: E-TECH Testing Services  
Date of request: April 30, 2009

You requested that we find this system acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Requirements**

Roadside safety systems should meet the guidelines contained in the NCHRP Report 350. FHWA Memorandum "[ACTION](#): Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

### **Description**

The SSG<sup>TM</sup>-200 Security Barrier is designed to manage the ingress and egress of vehicular traffic through secured areas. It is composed of two sections or halves that are joined at the centerline of the system. As the vehicle impacts the barrier, it engages sets of round tubes which get reshaped by sets of "shapers". This reshaping of the round tubes dissipates kinetic energy in a controlled fashion and vehicles are brought to controlled stops. The SSG<sup>TM</sup>-200 also includes housings containing electro-mechanical components that lower and raise the barrier. The overall



width of the barrier, not including the lifting mechanism, is 4.77 m (15.7 ft). The thickness of the barrier is 147 mm (5.8 in) and the height of the barrier is 686 mm (27 in). The width of the system, including the lifting mechanism and covers, is 5.90 m (23.2 ft). The length of the barrier's foundation is 3.66 m (12.0 ft).

### **Crash Testing**

Successful full-scale crash tests, NCHRP Report 350 Tests 2-30 and 2-31, were conducted on the SSG™-200 Security Barrier as required per NCHRP Report 350. It should be noted that performance improvements were made during the course of development and these are summarized in the document you provided, "Engineering Summary of the SSG™-200". To verify that these improvements had no negative effect on the overall system performance, the worst case test, NCHRP Report 350 test 2-31, was repeated. In each test, the barrier extended smoothly and brought the impact vehicle to rest in a controlled manner. After each test, the foundations and mounting stanchions were completely reusable. Only the expended barriers required replacement.

NCHRP 350 Test 2-31 (2000P/70KPH/0 deg) resulted in a longitudinal ridedown acceleration of -15.9 G and a longitudinal Delta-V of 7.4 m/s. Test 2-30 (820C/70KPH/0 deg) resulted in a longitudinal ride down acceleration of -12.4 G and a longitudinal Delta-V of 8.7 m/s. You also noted that there were no fragments or other debris from the security barrier that showed potential for penetrating the occupant compartments of either the impacting vehicles or that would present an undue hazard to other traffic or pedestrians.

### **Findings**

Therefore, the system described above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

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

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system 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 system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our 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 it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.

- To prevent misunderstanding by others, this letter of acceptance is designated as number B-195 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.
- The SSG™-200 security barrier is a patented product and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS 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.
- This acceptance 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 acceptance letter is limited to the crashworthiness characteristics of the candidate system, 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.

Sincerely yours,



David A. Nicol, P.E.  
Director, Office of Safety Design  
Office of Safety

Enclosures



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t = 0.075 sec



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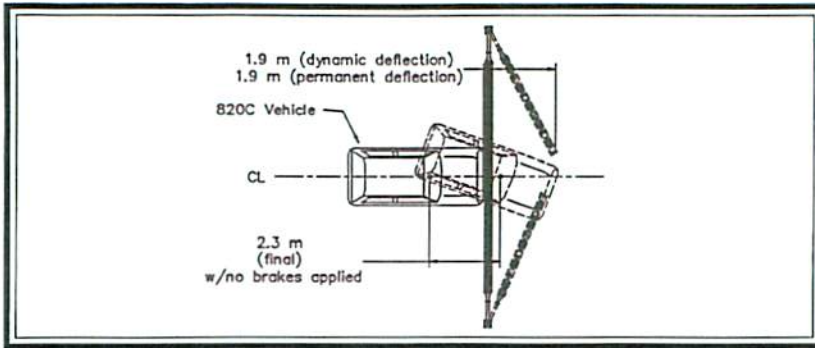
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E-TECH Testing Services, Inc.

**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 2-30  
 Test No. .... 01-8433-003  
 Date ..... 2/27/09

**Test Article**

Type ..... SSG - 200™ Security Barrier  
 ..... 16 Ga. steel sheet panels  
 ..... Tubing (2X) 9 Ga round - 60.3 mm steel  
 ..... Shaper collars, pusher plates & four cables  
 Installation Length ..... 6864 x 876 x 149 mm (LxH xW)

Material and key elements ..... ASTM A653/A653M for sheet steel  
 ..... ASTM A-513 grade 108 for tubing

Foundation Type and Anchoring ..... Nominal 27.6 MPa concrete pad  
 ..... 6864 x 3645 x 406 m (LxWxT)  
 ..... Hilti Epoxy RE-500 used to hold the anchors in place.

**Test Vehicle**

Type ..... Production Model  
 Designation ..... 820C  
 Model ..... 1992 Ford Festiva  
 Mass (kg)  
 Curb ..... 794  
 Test inertial ..... 838  
 Dummy ..... 75  
 Gross ..... 913

**Impact Conditions**

Speed (km/h) ..... 71.7  
 Angle (deg) ..... 0  
 Impact Severity (kJ) ..... 166.1

**Exit conditions**

Speed (km/h) ..... N/A  
 Angle (deg - veh. c.g.) ..... N/A

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 8.7  
 y-direction ..... 0.1  
 Ridedown Acceleration (g's)  
 x-direction ..... -12.4  
 y-direction ..... 4.0

**European Committee for Normalization (CEN) Values**

THIV (km/h) ..... 31.4  
 PHD (g's) ..... 12.5  
 ASI ..... 1.0

**Test Article Deflections (m)**

Dynamic ..... 1.9  
 Permanent ..... 1.9

**Vehicle Damage (Primary Impact)**

Exterior  
 VDS ..... FD-3  
 CDC ..... 12FDEW3  
 Interior  
 VCDI ..... AS0000000  
 Maximum Deformation (mm) ..... Negligible

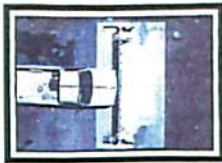
**Post-Impact Vehicular Behavior (deg - rate gyro)**

Maximum Roll Angle ..... 4.1  
 Maximum Pitch Angle ..... 5.8  
 Maximum Yaw Angle ..... 5.6

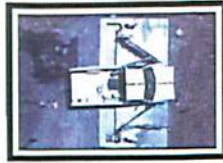
SSG - 200 Security Barrier Crash Test Results - 22 of 62

**Figure 11. SSG - 200 Security Barrier System NCHRP 350 Test 2-31 Test 01-8433-003**

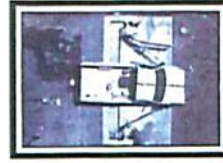




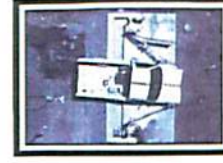
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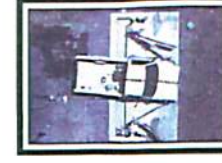
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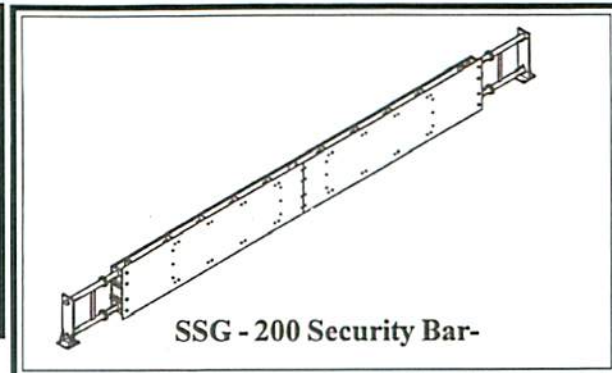
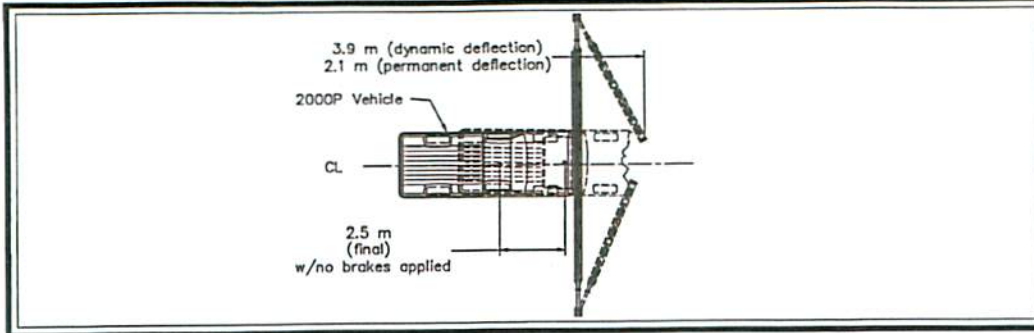
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t = 1.265



E-TECH Testing Services, Inc.



SSG - 200 Security Bar-

SSG - 200 Security Barrier Crash Test Results - 16 of 62

<b>General Information</b>			
Test Agency .....	E-TECH Testing Services, Inc.	Exit conditions	
Test Designation .....	NCHRP 350 Test 2-31	Speed (km/h) .....	N/A
Test No. ....	01-8433-001	Angle (deg - veh. c.g.) .....	N/A
Date .....	8/01/08	<b>Occupant Risk Values</b>	
<b>Test Article</b>		Impact Velocity (m/s)	
Type .....	SSG - 200™ Security Barrier	x-direction .....	7.4
.....	16 Ga. steel sheet panels	y-direction .....	-1.2
.....	Tubing (2X) 9 Ga round - 60.3 mm steel	Ridedown Acceleration (g's)	
.....	Shaper collars, pusher plates & three cables	x-direction .....	-15.9
.....	.....	y-direction .....	8.1
Installation Length .....	6864 x 775 x 149 mm (LxHxW)	<b>European Committee for Normalization (CEN) Values</b>	
Material and key elements .....	ASTM A653/A653M for sheet steel	THIV (km/h) .....	27.4
.....	ASTM A-513 grade 108 for tubing	PHD (g's) .....	15.9
Foundation Type and Anchoring .....	Nominal 27.6 MPa concrete pad	ASI .....	1.0
.....	6864 x 3645 x 406 mm (LxWxT)	<b>Test Article Deflections (m)</b>	
.....	Hilti Epoxy RE-500 used to hold the	Dynamic .....	3.9
.....	anchors in place.	Permanent .....	2.1
<b>Test Vehicle</b>		<b>Vehicle Damage (Primary Impact)</b>	
Type .....	Production Model	Exterior	
Designation .....	2000P	VDS .....	FD-3
Model .....	1989 GMC C2500	CDC .....	12FDEW3
Mass (kg)		Interior	
Curb .....	1887	VCDI .....	AS0000000
Test inertial .....	1993	Maximum Deformation (mm) .....	Negligible
Dummy .....	N/A	<b>Post-Impact Vehicular Behavior (deg - rate gyro)</b>	
Gross .....	1993	Maximum Roll Angle .....	5.6
Impact Conditions		Maximum Pitch Angle .....	5.7
Speed (km/h) .....	70.3	Maximum Yaw Angle .....	-4.9
Angle (deg) .....	0		
Impact Severity (kJ) .....	380.0		

Figure 6. SSG - 200 Security Barrier System NCHRP 350 Test 2-31 Test 01-8433-001

NCHRP 350  
TEST MATRIX

TERMINALS & CRASH CUSHIONS

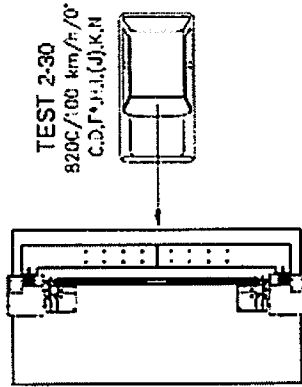
→ = 820C  
→ = 2000CP

TL-2 (70 km/h = 43.5 mph)

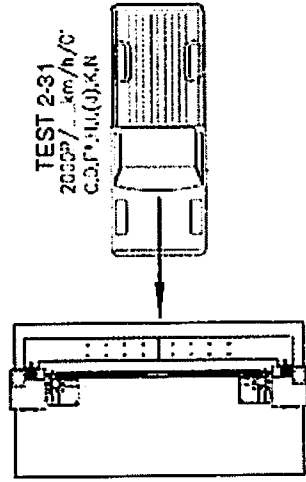
(SSG-200)

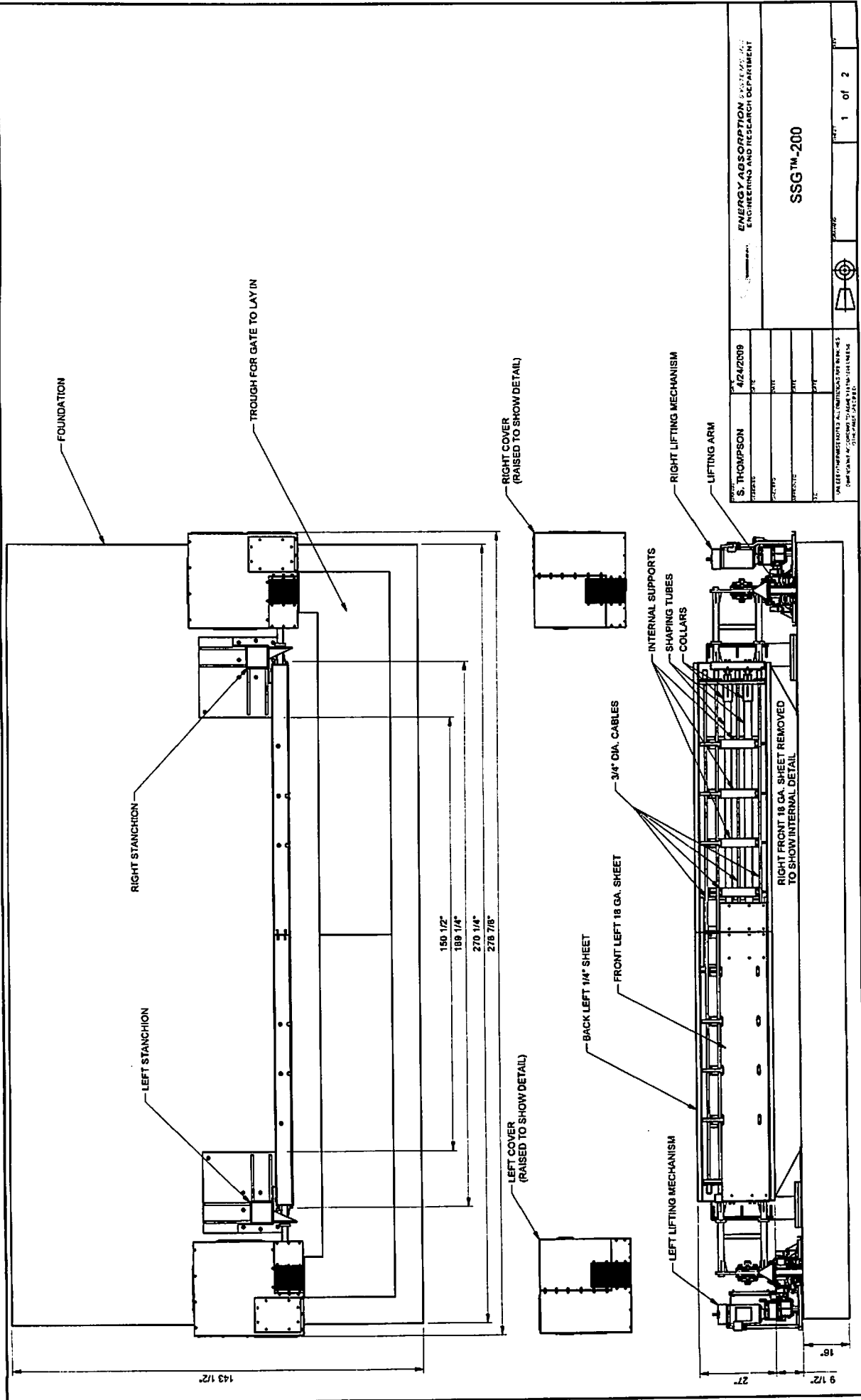
\* F FOR TL-2; G FOR TL-1

PASSED



PASSED





DATE	4/24/2009	PROJECT	SSG TM-200
DESIGNED BY	S. THOMPSON	CHECKED BY	
DRAWN BY		DATE	
SCALE		PROJECT NO.	
ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED TO BE IN INCHES AND DECIMALS THEREOF. DIMENSIONS IN PARENTHESES ARE TO BE IN MILLIMETERS.			
ENERGY ASSOCIATION ENGINEERS AND RESEARCH DEPARTMENT		SHEET 1 of 2	