

September 5, 2003

Refer to: HSA-10/CC-82

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

Dear Mr. Stephens:

Your May 22, 2003, letter to Mr. Richard Powers of my staff consolidated previously-submitted information with additional test data on an impact attenuator named the FastBrake and requested formal FHWA acceptance for its use on the National Highway System (NHS). Included with that letter were copies of a May 2003 test report prepared by E-TECH Testing Services, Inc., entitled “NCHRP Report 350 Crash Test Results for the FastBrake System”. On August 5, 2003, your representative, Mr. Douglas Bernard, delivered some final information that had been requested by my staff to aid in our review.

The FastBrake attenuator is a modified version of your current BrakeMaster which was accepted as a Report 350 terminal/attenuator via FHWA acceptance letter CC-41, dated June 19, 1997. While the BrakeMaster required a separate transition design when used to shield a concrete barrier, the FastBrake has a backup assembly that includes tubular steel stiffeners, a rear cable anchor, a standoff bracket, and a wheel deflector. It is intended to shield temporary concrete barrier and must be attached to an unanchored concrete safety shape a minimum of 6.1-m long as tested. This 6.1-m segment may be a single precast section or two 3.0-m (or 3.8-m) segments spliced together as shown in Enclosure 1B. Barrier segments beyond the initial 6.1-m segment may be shorter, but all require use of a Report 350 pin and loop (or equal) connection. Since the front four bays and the attenuator nose are identical to the original BrakeMaster, any of the front anchor options approved for use with the BrakeMaster may also be used with the FastBrake attenuator, design details for which are shown in Enclosures 1A and 1B.

You ran three tests on the FastBrake: NCHRP Report 350 tests 3-31, 3-37, and 3-38, the summary results of which are shown on Enclosure 2. In test 3-37, the initial impact point was 0.3 m downstream from the nose of the FastBrake and the pickup truck was contained and redirected. In test 3-38, the centerline of the truck was aimed at the center of the concrete barrier and the test vehicle was again redirected. Based on the successful outcome of all three new tests, the FastBrake is classified as a non-gating redirective crash cushion at test level 3 and it may be used on the NHS at the discretion of the contracting authority.

You also requested that the FastBrake be accepted for use in bi-directional locations with the

fender panels lapped in opposite directions on each side, noting that a head-on crash into a bi-directional configuration would prove satisfactory because the first bay does not collapse and would prevent vehicular contact with the reverse-lap panels. For a head-on impact, this seems to be a reasonable assumption, but for a left-of-center, end-on hit, the impacting vehicle would likely yaw clockwise, making the passenger compartment vulnerable to contact with the open ends of the reverse-lap panels. However, considering the low probability of such an impact when the FastBrake is used to terminate a median barrier, I am willing to waive test 3-30 on the bi-directional unit on the condition that median or other bi-directional installations be monitored by your company to verify acceptable field performance and that the results of this in-service evaluation be reported to my staff within two years from the date of this letter.

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, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device may 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 it will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number CC-82 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.
- The FastBrake is a patented device and is considered proprietary. If a proprietary device is *specified by a highway agency* for use on Federal-aid projects, except exempt, non-NHS projects, it: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that it is essential for synchronization with existing highway facilities or that no equally suitable alternative exists or; (c) it must be used for research or for a distinctive type of construction on

relatively short sections of road for experimental purposes. On the other hand, if the selection of a crashworthy safety device for temporary use in a work zone *is left to the discretion of the contractor*, one can presume that condition (a) above has been satisfied. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which has been previously sent to you.

Sincerely yours,

(original signed by John R. Baxter)  
John R. Baxter, P.E.  
Director, Office of Safety Design  
Office of Safety

2 Enclosures



D. Illustrations

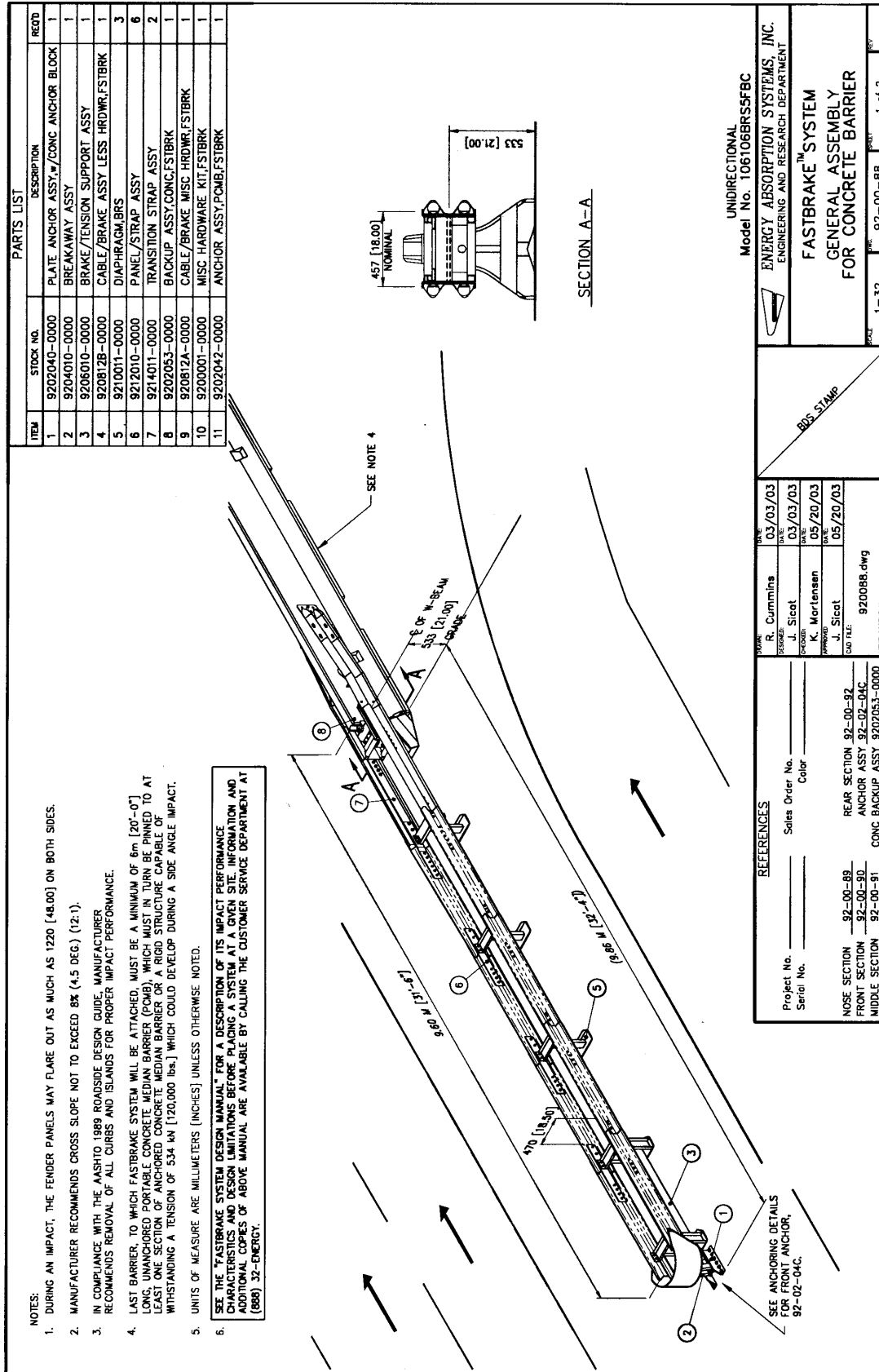


Illustration D-1. FastBrake System General Assembly for Concrete Barrier (1 of 1)

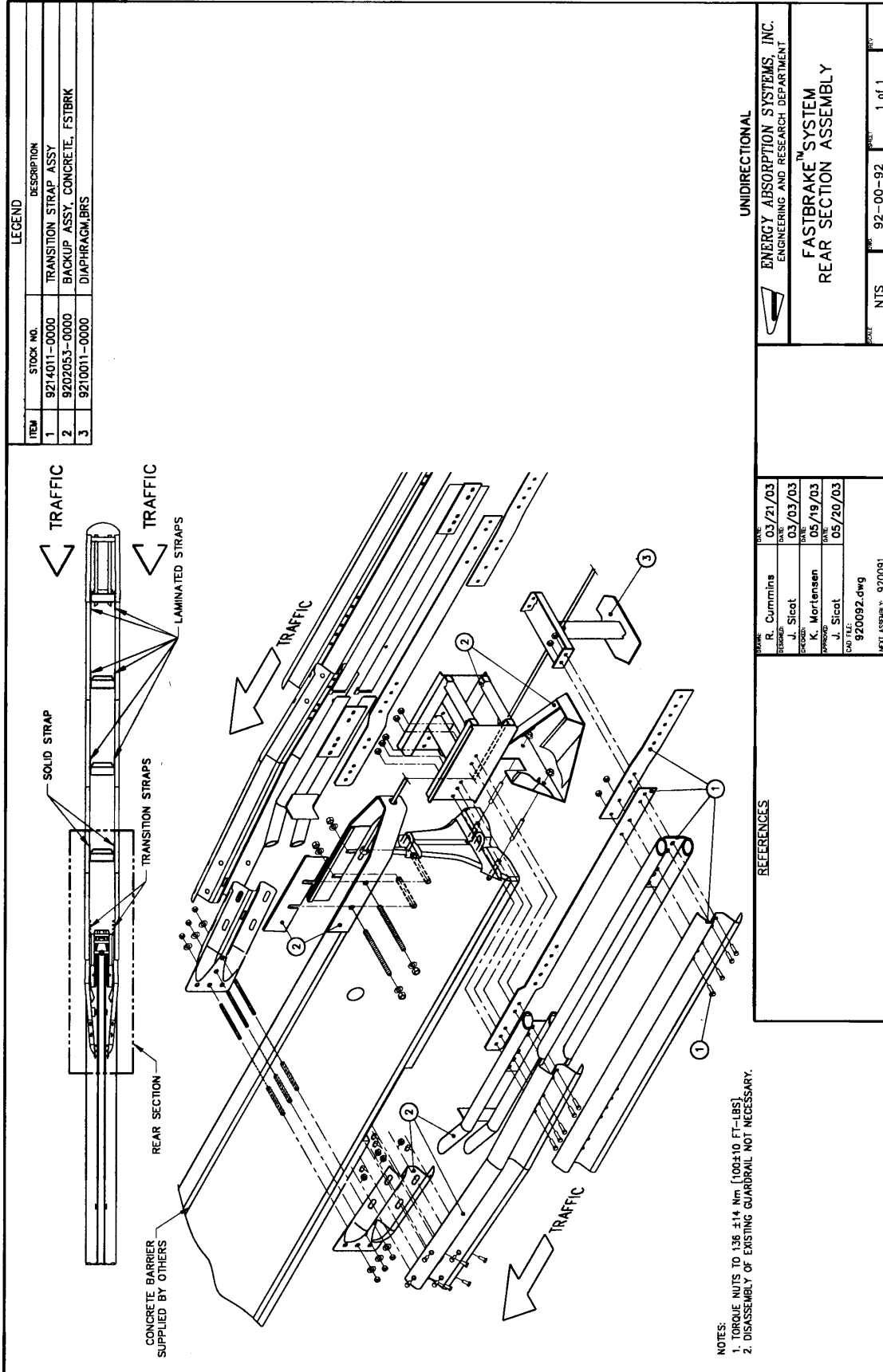


Illustration D-2. FastBrake System Backup and Transition Assembly (1 of 1)

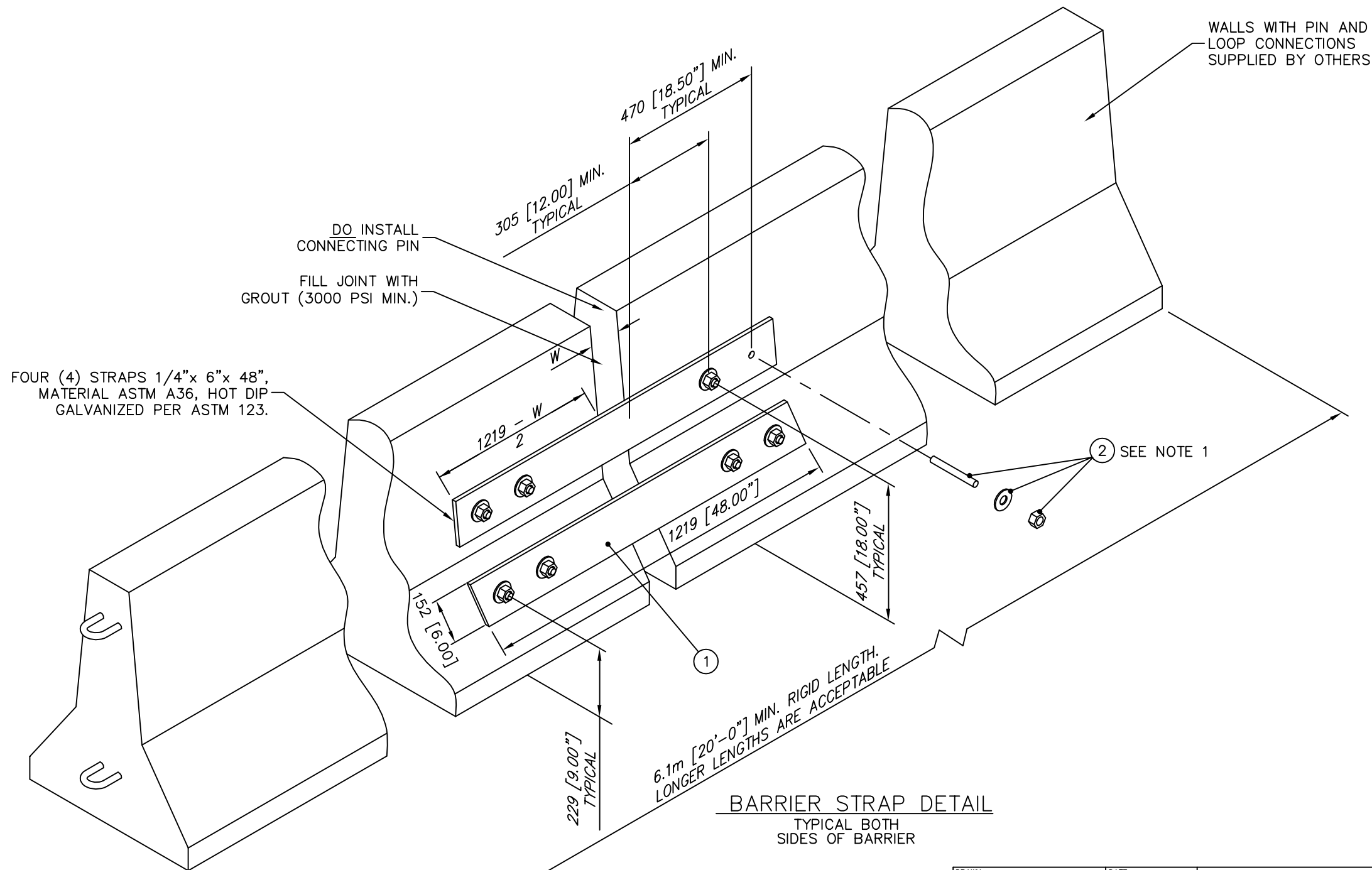
NEXT ASSEMBLY:

MATERIAL:

TOL ANGULAR: ± 1°  
TOL LINEAR: ± 1/16"  
UNLESS OTHERWISE NOTED.

PARTS LIST


ITEM	STOCK NO.	DESCRIPTION	REQ'D
1		GALV. STEEL STRAPS, 1/4x6x48	4
2	3525130-0000	ANCHOR,MP-3,PT KIT,3/4X6 1/2 HOR	3

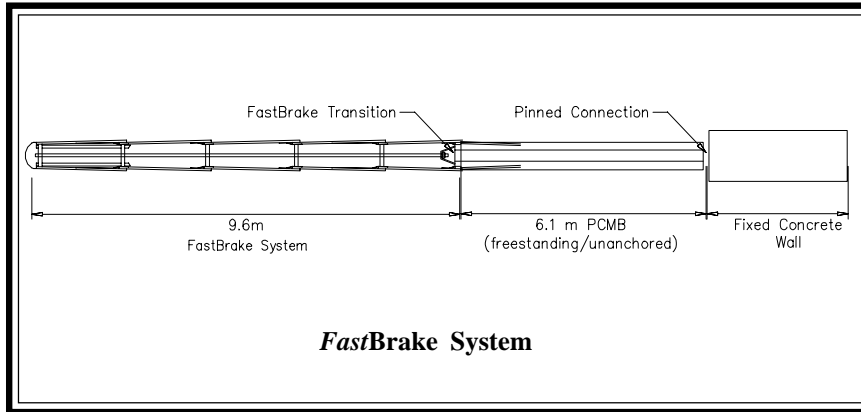
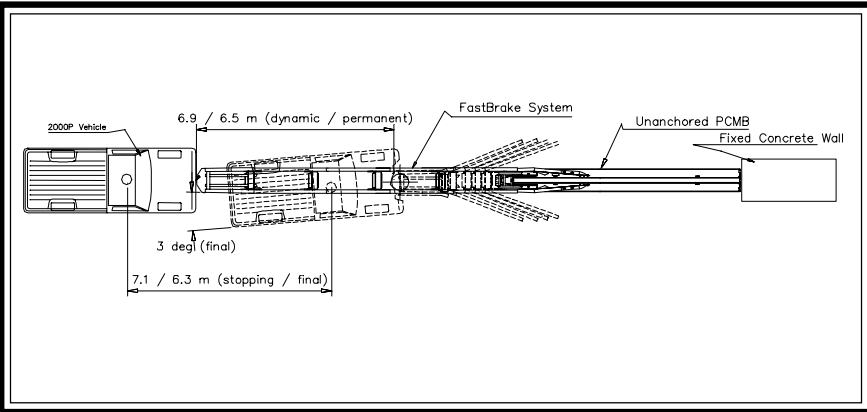


NOTES:

1. MINIMUM DEPTH INTO CONCRETE = 127mm [5.00].
2. UNITS OF MEASUREMENT ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.

DRAWN: W. LEDDINGTON	DATE: 8/26/03
DESIGNED:	DATE:
CHECKED: S. TRAGESER	DATE: 8/26/03
APPROVED: B. STEPHENS	DATE: 8/26/03
Q.C.:	DATE:
CAD FILE: 9202054-0000.dwg	SCALE: 1=1/16"

 <b>ENERGY ABSORPTION SYSTEMS, INC.</b> ENGINEERING AND RESEARCH DEPARTMENT	RECOMMENDED METHOD TO ACHIEVE MINIMUM 6.1m [20'-0"] RIGID PCMB IF ONLY SHORTER SECTIONS OF PCMB ARE AVAILABLE.



**FastBrake System**

**E-TECH Testing Services, Inc.**  
 3617 B Cincinnati Avenue  
 Rocklin, CA 95765  
 PHONE (916) 645-8188  
 FAX (916) 645-3653

**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 3-31  
 Test No. .... 01-7606-007  
 Date ..... 4/22/03

**Test Article**

Type ..... Energy Absorption Systems, Inc.  
 ..... FastBrake System  
 Installation Length ..... 9.6 m  
 Size and/or dimension and material  
 of key elements ..... FastBrake with w-beam transition  
 ..... to 6.1 m unanchored PCMB  
 Foundation and Anchoring ..... Dry concrete, front plate type  
 ..... anchor with rear unanchored  
 ..... PCMB

**Test Vehicle**

Type ..... Production Model  
 Designation ..... 2000P  
 Model ..... 1990 Chevrolet C-2500  
 Mass (kg)  
 Curb ..... 1840  
 Test inertial ..... 1980  
 Dummy ..... N/A  
 Gross Static ..... 1980

**Impact Conditions**

Speed (km/h) ..... 99.7  
 Angle (deg) ..... 0  
 Impact Severity (kJ) ..... 758.8 kJ

**Exit conditions**

Speed (km/h) ..... N/A  
 Angle (deg) ..... N/A

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 7.3  
 y-direction ..... -0.5  
 Ridedown Acceleration (g's)  
 x-direction ..... -18.8  
 y-direction ..... -6.8

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

THIV (km/h) ..... 26.3  
 PHD (g's) ..... 19.0  
 ASI ..... 1.0

**Test Article Deflections (m)**

Dynamic ..... 6.9  
 Permanent ..... 6.5

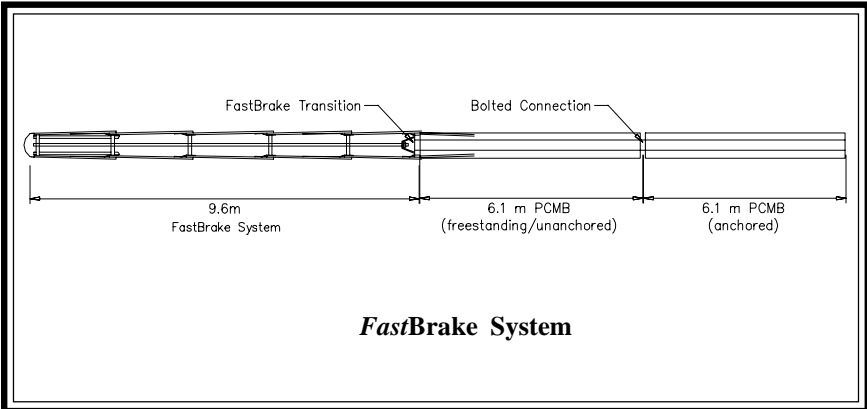
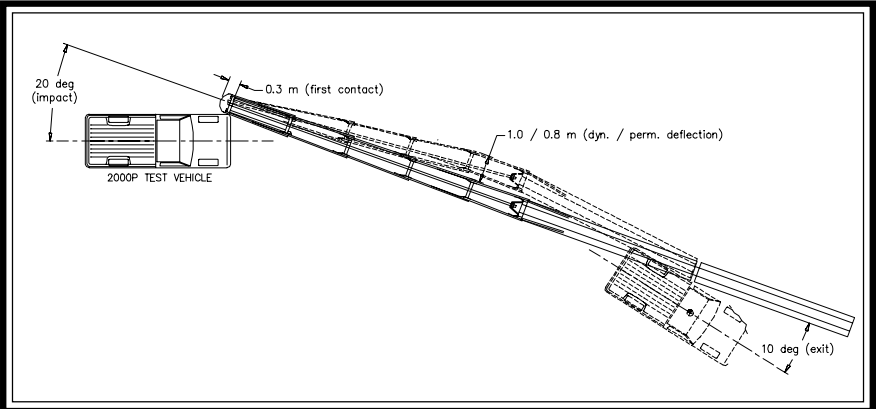
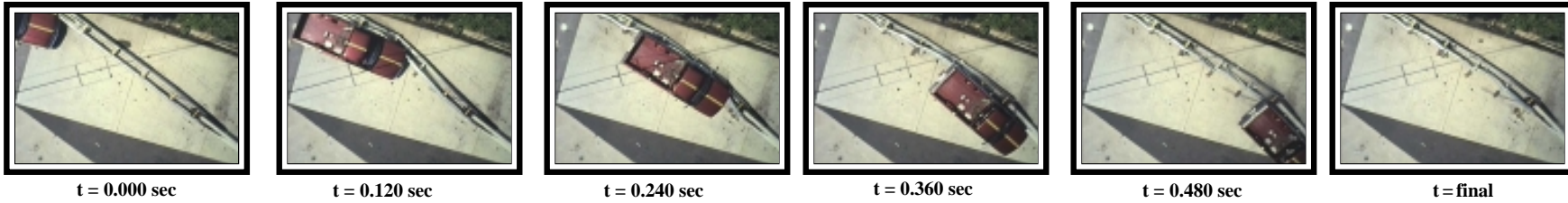
**Vehicle Damage (Primary Impact)**

**Exterior**  
 VDS ..... FC-3  
 CDC ..... 12FCEW2  
**Interior**  
 VCDI ..... AS0000000  
 Deformation (mm - max) ..... Negligible

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

Maximum Roll Angle ..... -2.1  
 Maximum Pitch Angle ..... -3.3  
 Maximum Yaw Angle ..... -3.1

**Figure 1. Summary of Results - FastBrake System Test 01-7606-007**



**FastBrake System**

**E-TECH Testing Services, Inc.**  
 3617 B Cincinnati Avenue  
 Rocklin, CA 95765  
 PHONE (916) 645-8188  
 FAX (916) 645-3653

**General Information**

Test Agency .....	E-TECH Testing Services, Inc.
Test Designation .....	NCHRP 350 Test 3-37
Test No. ....	01-7606-008
Date .....	5/7/03

**Test Article**

Type .....	Energy Absorption Systems, Inc.
.....	FastBrake System
Installation Length .....	9.6 m
Size and/or dimension and material of key elements .....	FastBrake with w-beam transition to 6.1 m unanchored PCMB
Foundation and Anchoring .....	Dry concrete, front plate type anchor with rear unanchored PCMB

**Test Vehicle**

Type .....	Production Model
Designation .....	2000P
Model .....	1989 Chevrolet C-2500
Mass (kg)	
Curb .....	1917
Test inertial .....	2009
Dummy .....	N/A
Gross Static .....	2009

**Impact Conditions**

Speed (km/h) .....	101.8
Angle (deg) .....	20
Impact Severity (kJ) .....	93.9 kJ

**Exit conditions**

Speed (km/h) .....	64.8
Angle (deg) .....	10

**Occupant Risk Values**

Impact Velocity (m/s)	
x-direction .....	4.3
y-direction .....	3.9
Ridedown Acceleration (g's)	
x-direction .....	-15.0
y-direction .....	9.6

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

THIV (km/h) .....	19.6
PHD (g's) .....	15.3
ASI .....	0.6

**Test Article Deflections (m)**

Dynamic .....	1.0
Permanent .....	0.8

**Vehicle Damage (Primary Impact)**

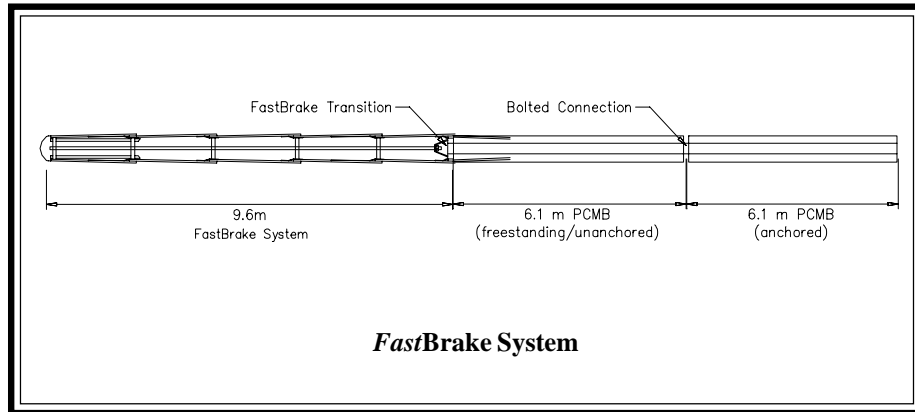
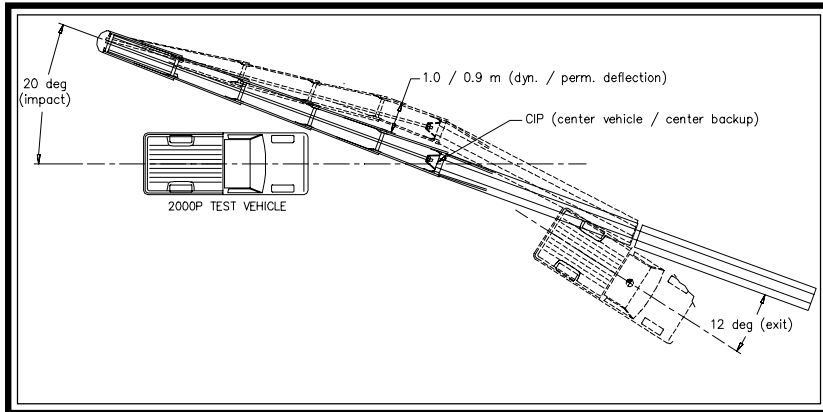
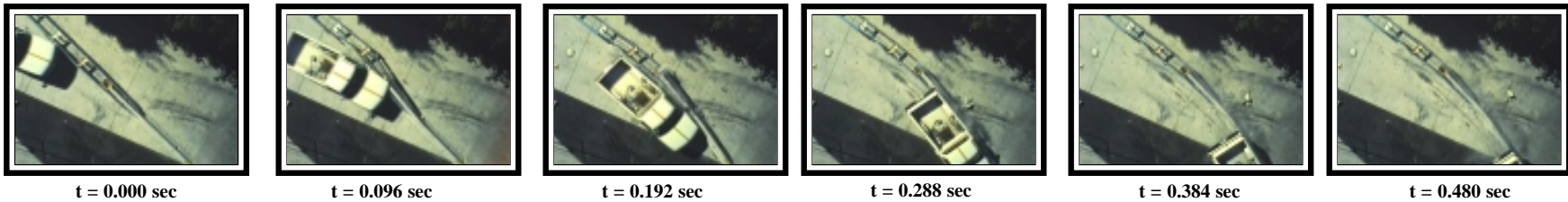
Exterior	
VDS .....	LFQ-4
CDC .....	11LDEW3
Interior	
VCDI .....	AS0000000
Deformation (mm - max) .....	Negligible

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

Maximum Roll Angle .....	-11.3
Maximum Pitch Angle .....	2.9
Maximum Yaw Angle .....	30.4

**Figure 6. Summary of Results - FastBrake System Test 01-7606-008**





**E-TECH Testing Services, Inc.**  
 3617 B Cincinnati Avenue  
 Rocklin, CA 95765  
 PHONE (916) 645-8188  
 FAX (916) 645-3653

**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 3-38  
 Test No. .... 01-7606-006  
 Date ..... 2/18/03

**Test Article**

Type ..... Energy Absorption Systems, Inc.  
 ..... FastBrake System  
 Installation Length ..... 9.6 m  
 Size and/or dimension and material  
 of key elements ..... FastBrake with w-beam transition  
 ..... to 6.1 m unanchored PCMB  
 Foundation and Anchoring ..... Dry concrete, front plate type  
 ..... anchor with rear unanchored  
 ..... PCMB

**Test Vehicle**

Type ..... Production Model  
 Designation ..... 2000P  
 Model ..... 1988 Chevrolet C-2500  
 Mass (kg)  
 Curb ..... 1900  
 Test inertial ..... 2014  
 Dummy ..... N/A  
 Gross Static ..... 2014

**Impact Conditions**

Speed (km/h) ..... 101.1  
 Angle (deg) ..... 20  
 Impact Severity (kJ) ..... 92.8 kJ

**Exit conditions**

Speed (km/h) ..... 64.8  
 Angle (deg) ..... 12

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 5.5  
 y-direction ..... 5.0  
 Ridedown Acceleration (g's)  
 x-direction ..... -6.6  
 y-direction ..... 12.8

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

THIV (km/h) ..... 27.0  
 PHD (g's) ..... 13.7  
 ASI ..... 1.2

**Test Article Deflections (m)**

Dynamic ..... 1.0  
 Permanent ..... 0.9

**Vehicle Damage (Primary Impact)**

Exterior  
 VDS ..... LFQ-3  
 CDC ..... 10LDEW3  
 Interior  
 VCDI ..... AS0000000  
 Deformation (mm - max) ..... 27

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

Maximum Roll Angle ..... 17.4  
 Maximum Pitch Angle ..... -20.9  
 Maximum Yaw Angle ..... -53.8

**Figure 11. Summary of Results - FastBrake System Test 01-7606-006**