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

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

August 18, 2011

In Reply Refer To:
HSST/ CC-75D

Mr. Gerrit A. Dyke, P.E.
Vice President of Engineering and R & D
Barrier Systems, Inc.
3333 Vaca Valley Parkway, Suite 800
Vacaville, CA 95688

Dear Mr. Dyke:

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:	Universal TAU-IIR Crash Cushion Systems
Type of system:	Redirecting Crash Cushion/Impact Attenuator
Test Level:	NCHRP Report 350 Test Levels 2 and 3 (TL-2 and TL-3)
Testing conducted by:	Safe Technologies, Inc.
Date of request:	December 30, 2010
Date initially acknowledged:	January 4, 2011
Task Force 13 designator:	SCT 01c

You requested that we find this system, in its various configurations, acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350.

Requirements
Roadside safety devices should meet the guidelines contained in NCHRP Report 350 if tested prior to December 31, 2010. Devices tested after that date must follow the guidelines contained in the American Association of State Highway and Transportation Official's (AASHTO) Manual for Assessing Safety Hardware (MASH). The FHWA memorandum "ACTION: Identifying Acceptable Highway Safety Features" of July 24, 1997, provides further guidance on crash testing requirements of roadside features, including crash cushions.

Decision
The various configurations of the TAU-IIR crash cushion shown in Enclosure 1 are acceptable for use on the NHS at the impact speeds listed.

Description
The TAU-IIR crash cushion uses the same framework as that used in the TAU-II crash cushion configurations that were accepted by the FHWA in letters CC-75 through CC-75C. Specifically, the structural diaphragms, Thrie-beam side panels, slider bolts, backstop assemblies, cables, and anchoring systems are the same as those originally accepted for use on the NHS. The TAU-IIR design uses different energy absorbing cartridges that can be partially self-restoring after some impacts, thereby reducing the need for immediate repairs. These cartridges are made from proprietary hyperelastic (HE) polyurethane and are identified as Type1, 2, or 3 depending on the wall thickness of the cylindrical elements. Dimensions for each type are shown in Enclosure 2. A typical TL-3 installation is shown in Enclosure 3.

Crash Testing
Since only the energy-absorbing elements were changed from the TAU-II design, it was mutually agreed that only the end-on tests were needed to verify acceptable crash performance. Tests were conducted on specific configurations to determine the occupant risk factors for narrow parallel designs, moderately flared designs and wide designs for TL-2 and TL-3 impact speeds. One test was run with an impact speed of 110 km/h (70 mph). Using finite element analysis (FEA) and the results of the full-scale tests that were run, a report prepared by Roadsafe LLC for Barrier Systems, Inc. concluded that the various configurations shown in Enclosure 1were likely to produce acceptable compliance with Report 350 evaluation criteria for end-on impacts. The following summaries describe the tests that were conducted by Safe Technologies, Inc. on specific configurations of the TAU-IIR:

Narrow (parallel) at TL-2
NCHRP Report 350 tests 2-30 and 2-31 were conducted on a narrow unit at 70 km/h (42 mph) to assess the capacity and occupant risk factors associated with a lower speed impact by both test vehicles. For test 2-30, the unit was anchored to an AC base; in test 3-31, a concrete base was used. The TAU-IIR design for both tests consisted of a 4-bay unit with one Type 3 element nose piece, two Type 1 elements in bay 1, and two Type 2 elements in both bays 3 and 4. Enclosures 3 and 4 show the crash cushion design and the test summaries for the small car and the pickup truck, respectively.

Narrow (parallel) at TL-3
Tests 3-31 and 3-32 were conducted on a narrow, parallel-sided 8-bay design. The tested configuration consisted of a Type 3 element nose piece, three bays containing two Type 1 elements per bay, and five bays containing two Type 2 elements per bay. Enclosure 5 shows the tested crash cushion design and the summary sheets for both tests. This tested TL-3 configuration does not use any Type 3 elements in its interior bays.

Narrow (parallel) at TL-3
Test 3-30 was conducted on a narrow, parallel-sided crash cushion to determine its crashworthiness at an impact speed of 110 km/h (70 mph). The tested configuration was a 10-bay unit, consisting of a Type 3 nose piece, three bays containing two Type 1 elements per bay, four bays containing two Type 3 elements per bay, and three bays containing two Type 2 elements per bay. Enclosure 6 shows the tested design and the crash test summary sheet.

Flared at TL-3
Test 3-31 was conducted to verify the crashworthiness of a flared side-panel layout. The TAU-IIR configuration tested was a seven bay design consisting of a Type 3 nose piece, three bays containing two Type 1 elements per bay, one bay containing two Type 2 elements, and three bays containing four Type 2 elements per bay. Enclosure 7 shows the tested design and the crash test summary sheet.

Wide (flared) at TL-3
Tests 3-30 and 3-31 were conducted on a wide-flared unit. The tested design was a 7-bay unit with a Type 3 nose piece, three bays containing two Type 1 elements per bay and four bays containing four tyle2 elements per bay. Enclosure 8 shows the tested design and the crash test summary sheet.

Findings
Based on our review of the information you submitted, the TAU-IIR designs described above and detailed in the enclosed drawings are acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency. In addition, any of the configurations depicted in Enclosure 1 are also acceptable for use on the NHS. The five TAU-IIR configurations that were crash-tested were used to validate the FEA model from which the "family" of designs was created. In comparing the model results to the full-scale crash tests, it was seen that the model predictions were almost always conservative (i.e., they over-predicted the occupant risk factors). Consequently, the non-tested TAU-IIR configurations may be used with confidence that they will perform acceptably under the impact speeds listed.

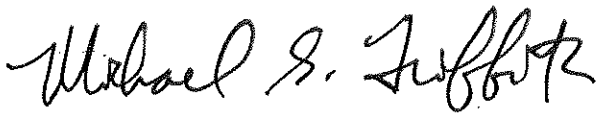
Transportation agencies specifying the 10-bay 110 km/h (70 mph) design should be advised that this unit met all NCHRP Report 350 evaluation criteria only for a head-on impact with the 2000P pickup truck at that speed. The remaining high-speed configurations were developed through analysis and should be equally acceptable for the head-on crash with the pickup truck. However, no assumption should be made that the remaining Report 350 tests for a crash cushion would meet all appropriate evaluation criteria at a 110 km/h (70 mph) impact speed. There is no federal requirement to specify crash cushions that exceed TL-3 capacity.

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

- This letter includes an AASHTO/ARTBA/AGC Task Force 13 designation that should be used when drafting new or revised Task Force 13 drawings.
- This acceptance is limited to the crashworthiness characteristics of the systems 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 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.

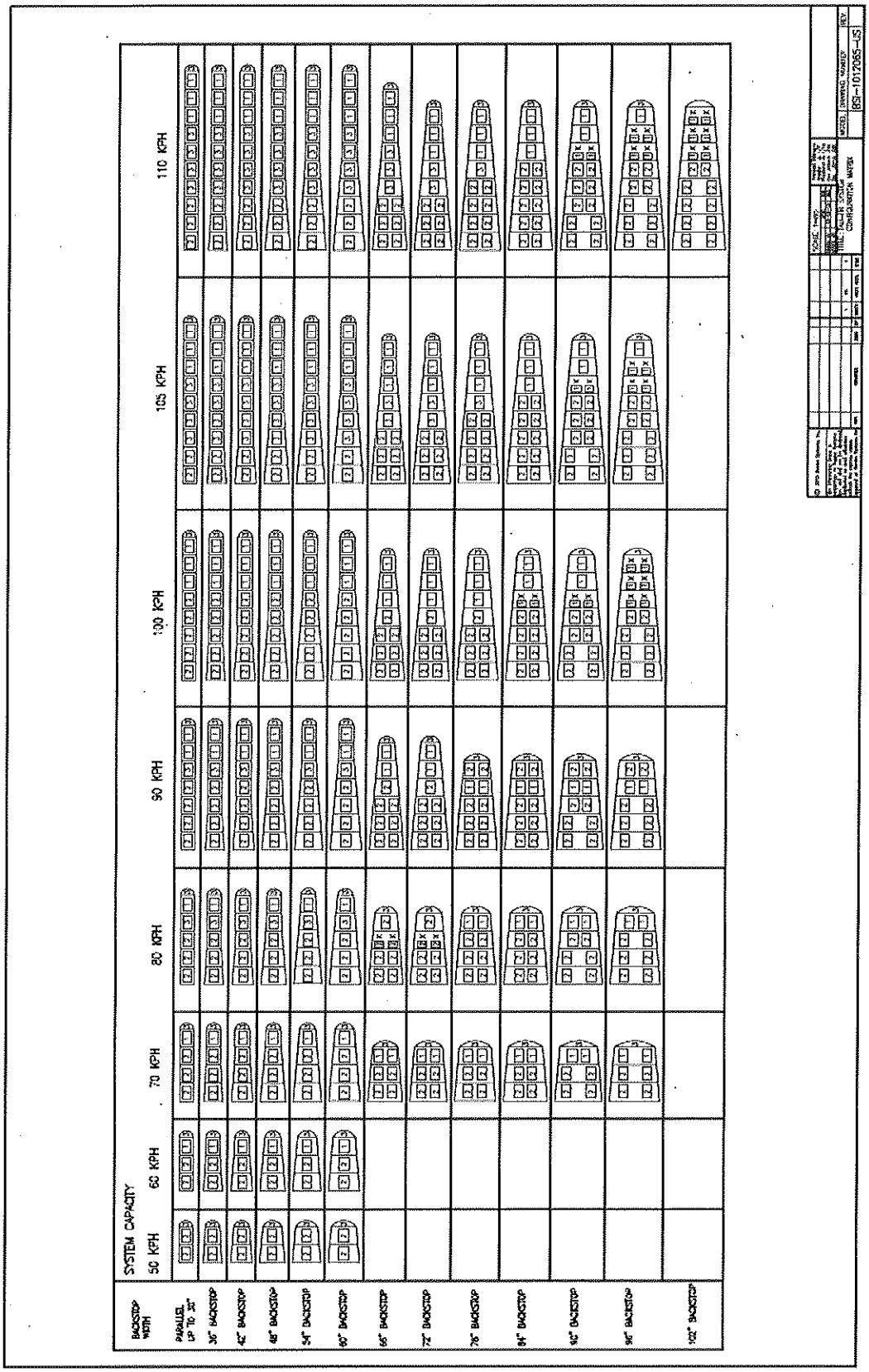
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number CC-75D 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 Universal TAU-IIR family of crash cushions are patented products and considered proprietary. If proprietary devices 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,



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

Enclosures

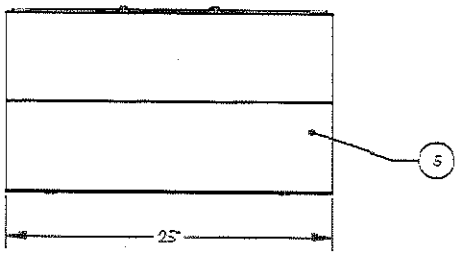

SYSTEM CAPACITY
50 KPH
60 KPH
70 KPH
80 KPH
90 KPH
100 KPH
105 KPH
110 KPH
BACKSTOP WIDTH
PARALLEL UP TO 35°
36" BACKSTOP
42" BACKSTOP
48" BACKSTOP
54" BACKSTOP
60" BACKSTOP
66" BACKSTOP
72" BACKSTOP
78" BACKSTOP
84" BACKSTOP
90" BACKSTOP
96" BACKSTOP
102" BACKSTOP
CONFIGURATION MATRIX
85S-1017085-US

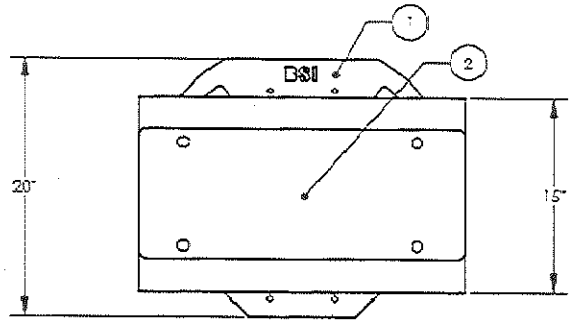
Enclosure 1

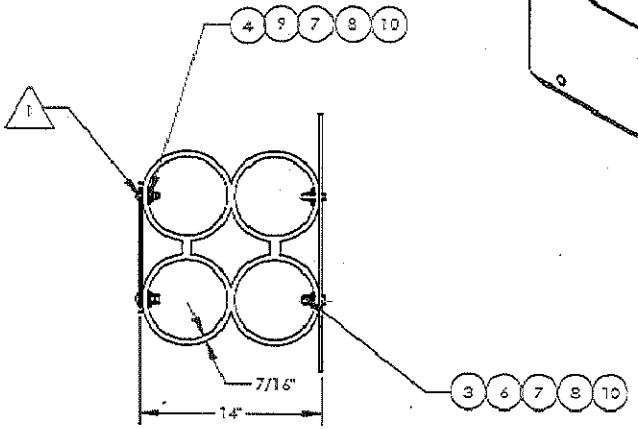
Enclosure 2 (1 of 3)

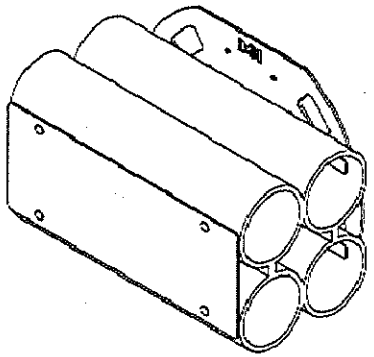
NOTES:
1. ALTERNATE BOLT PATTERN TOP/BOTTOM BASED ON POSITION IN BAY
2. ENERGY ASORBING ELEMENT MATERIAL: CE-762D CAST-URETHANE-FORMULATION

ITEM	QTY.	DESCRIPTION	UOM	PART NO.
1	1	ENERGY ABSORB ELEMENT BACK PL	EACH	BSI-1012042-DD
2	1	TAU II R BAL RAIL PLT	EACH	BSI-1012005-US
3	1	BATTON, INNER	EACH	BSI-1013136-UU
4	1	BATTON, OUTER	EACH	BSI-1013137-DD
5	1	ENERGY ABSORB ELEMENT TYP 1	EACH	BSI-1012069-US
6	4	C-SCR HH 3/8-16x1 3/4 GR5 Ptd	EACH	2000471
7	6	Nut HN 3/8-16 Grd Gal	EACH	2000405
8	6	Washr FI 3/8-10x1 Mtd	EACH	2001040
9	2	C-SCR HH 1/2-13x2 1/4 SS 316	EACH	2001144
10	6	Washr SL 3/8 Mtd	EACH	2001047









APPROVALS	
DRAWN BY:	S. DENNIS
DRAWN DATE:	12/16/10
APPD BY:	G. DYKE
APPD DATE:	12/16/10

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE:
FRACTIONS ±1/16 DECIMAL X = ±0.03 XXX = ±0.010 ANGLES ±1/2°
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

REV	ECN#	DATE
0		12/16/10

3333 Vaca Valley Parkway Ste #20
Vacaville, CA 95688
Tel: 866-800-3091
www.barriersystemsinc.com

TITLE
UNIVERSAL TAU-IIR SYSTEM
ENERGY ABSORBING ELEMENT ASSY. TYPE-1

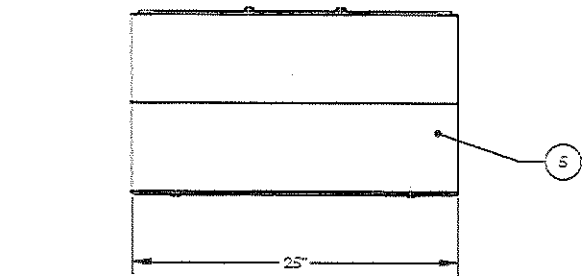
SIZE	DWG NO.	REV.
B	BSI-1012069-US	0

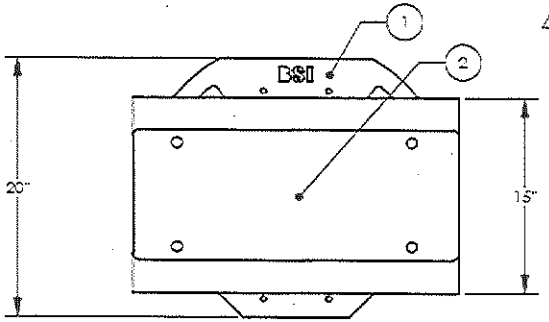
SCALE 1:8 SHEET 1 OF 1

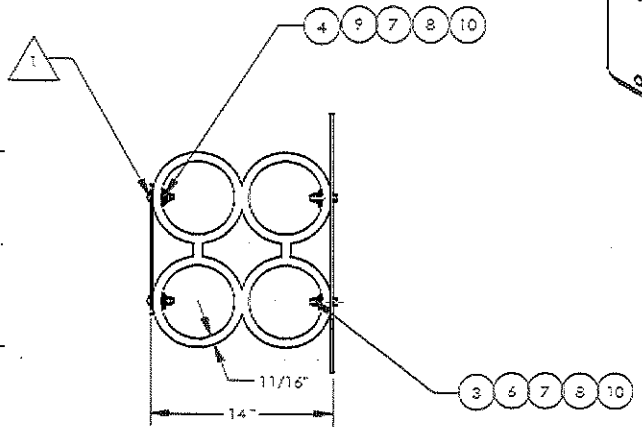
Enclosure 2 (2 of 3)

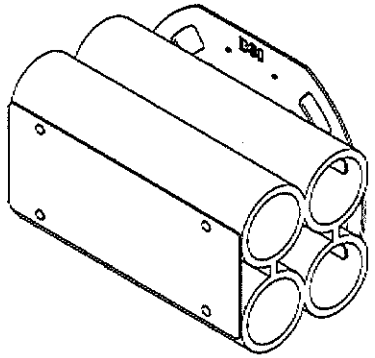
NOTES:
1. ALTERNATE BOLT PATTERN TOP/BOTTOM BASED ON POSITION IN BAY
2. ENERGY ASORBING ELEMENT MATERIAL: CE-762D CAST-URETHANE-FORMULATION

No.	QTY.	Description	UOM	No.
1	1	ENERGY ASORB ELEMENT BACK PL	EACH	BSI-1012049-00
2	1	TAU II R EAC FACE PLT	EACH	BSI-1012066-US
3	1	BATTON, INNER	EACH	BSI-1012016-00
4	1	BATTON, OUTER	EACH	BSI-1012017-00
5	1	ENERGY ABSORBING ELEMENT TY	EACH	BSI-1012063-US
6	4	C-Scr MH 3/8-16x1 3/4 Gr5 Ptd	EACH	2000371
7	6	Nut HN 3/8-16 Gr5 Ga	EACH	2000405
8	6	Wshr H 3/8-16x1 Ptd	EACH	2001090
9	2	C-Scr BH 3/8-16X1 3/4 SS316	EACH	2000194
10	6	Wshr SL 3/8 Ptd	EACH	2000087









APPROVALS	
DRAWN BY:	S. DENNIS
DRAWN DATE:	12/16/10
APPD BY:	G. DYKE PE
APPD DATE:	12/16/10

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE:
FRACTIONS ±1/16 DECIMAL .XX = ±.03 .XXX = ±.010 ANGLES ±1/2°
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

REV	ECN#	DATE
0		12/16/10

3333 Vaca Valley Parkway Ste 600
Vacaville, CA 95688
Tel: 888-840-3691
www.barriersystems.com

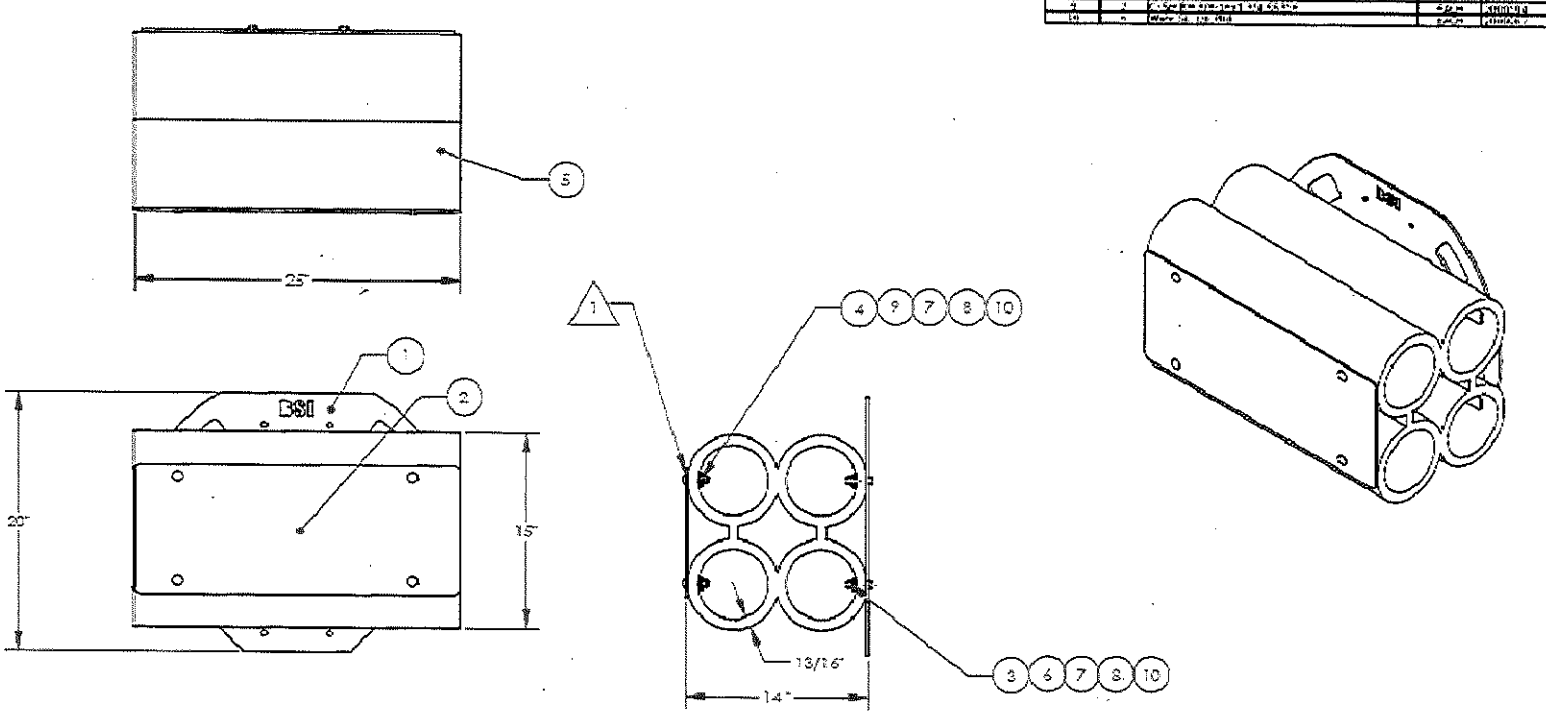
TITLE
UNIVERSAL TAU-IIR SYSTEM
ENERGY ASORBING ELEMENT ASSY. TYPE-2

SIZE	DWG NO.	REV.
B	BSI-1012070-US	0

SCALE 1:8 SHEET 1 OF 1

Enclosure 2 (3 of 3)

NOTES:
1. ALTERNATE BOLT PATTERN TOP/BOTTOM BASED ON POSITION IN BAY
2. ENERGY ASORBING ELEMENT MATERIAL: CE-762D CAST-URETHANE-FORMULATION



APPROVALS	
DRAWN BY:	S. DENNIS
DRAWN DATE:	12/16/10
APPVD BY:	G. DYKE PE
APPVD DATE:	12/16/10

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INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

REV	ECN#	DATE
0		12/16/10

3333 Vasco Valley Parkway Ste #240
Vacaville, CA 95688
Tel: 866-BND-SAFE
www.barriersystemsinc.com

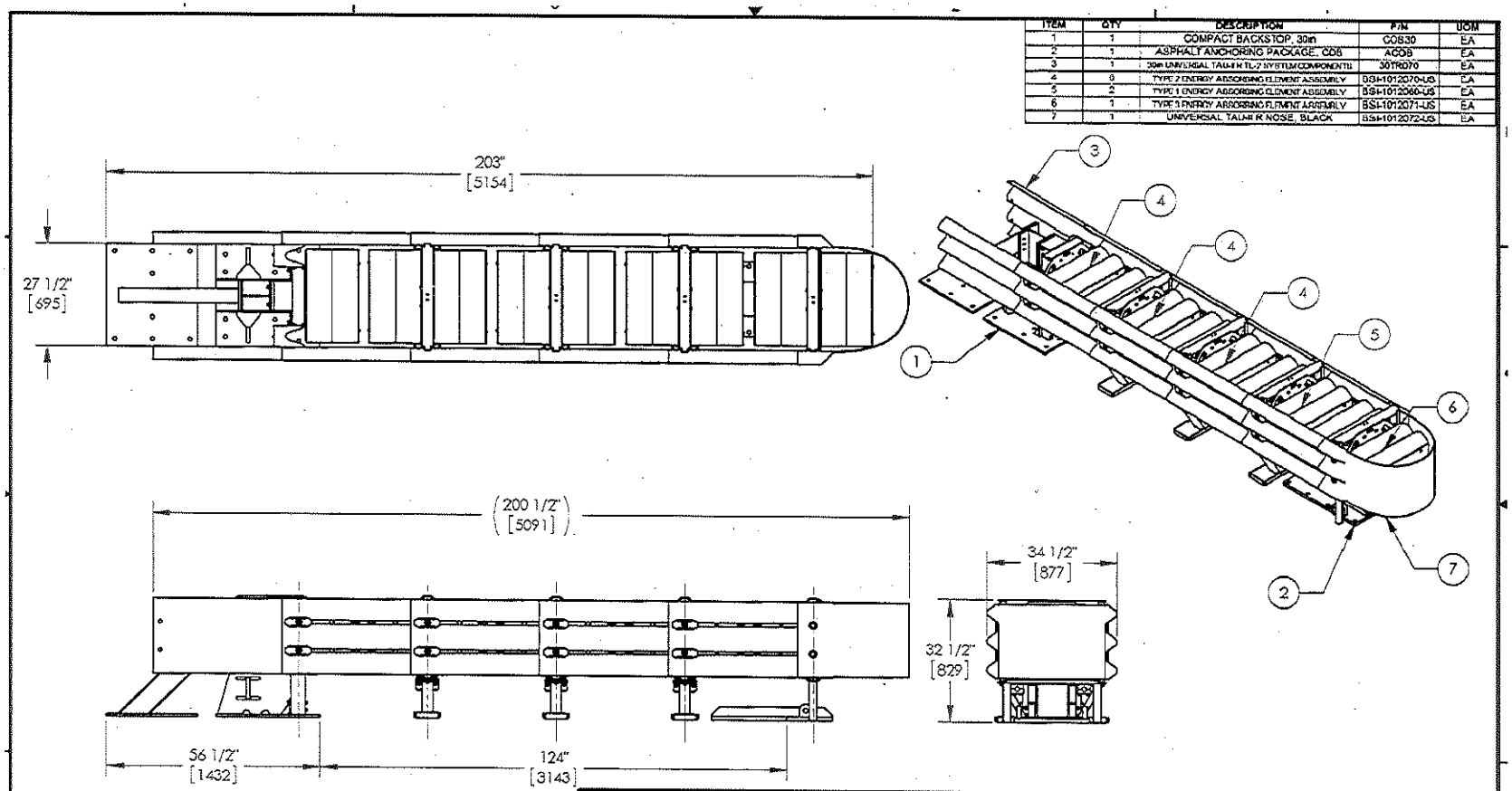
TITLE: UNIVERSAL TAU-IIR SYSTEM
ENERGY ASORBING ELEMENT ASSY. TYPE-3

SIZE	DWG. NO.	REV.
B	BSI-1012071-US	0

SCALE: 1:8 SHEET: 1 OF 1

Enclosure 3 (1 of 2)

ITEM	QTY	DESCRIPTION	P/N	UOM
1	1	COMPACT BACKSTOP, 30in	COB30	EA
2	1	ASPHALT ANCHORING PACKAGE, COB	ACOB	EA
3	1	30in UNIVERSAL TAU-II R TL-2 SYSTEM COMPONENTS	30TR070	EA
4	9	TYPE 2 ENERGY ABSORBING ELEMENT ASSEMBLY	BSI-1012070-US	EA
5	2	TYPE 1 ENERGY ABSORBING ELEMENT ASSEMBLY	BSI-1012060-US	EA
6	1	TYPE 3 ENERGY ABSORBING ELEMENT ARREMBLY	BSI-1012071-US	EA
7	1	UNIVERSAL TAU-II R NOSE, BLACK	BSI-1012072-US	EA



APPROVALS	
DRAWN BY:	AEM
DRAWN DATE:	12/16/10
APP'D BY:	GAD
APP'D DATE:	12/16/10

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FRACTIONS ±1/16 DECIMAL .XX = ± .03 .XXX = ± .010 ANGLES ±1/2°
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

REV	ECN#	DATE
1	BOM UPDATED	6/10/11
0	NEW DWG	12/20/10

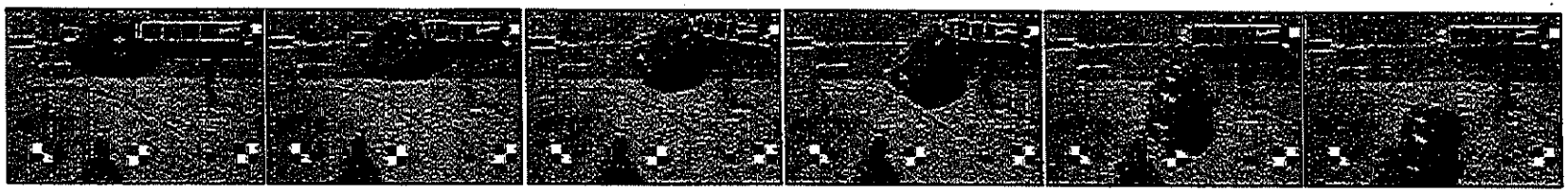
BARRIER SYSTEMS
3333 Vaca Valley Parkway Ste 600
Vacaville, CA 95688
Tel: 888-800-3691
www.barriersystemsinc.com

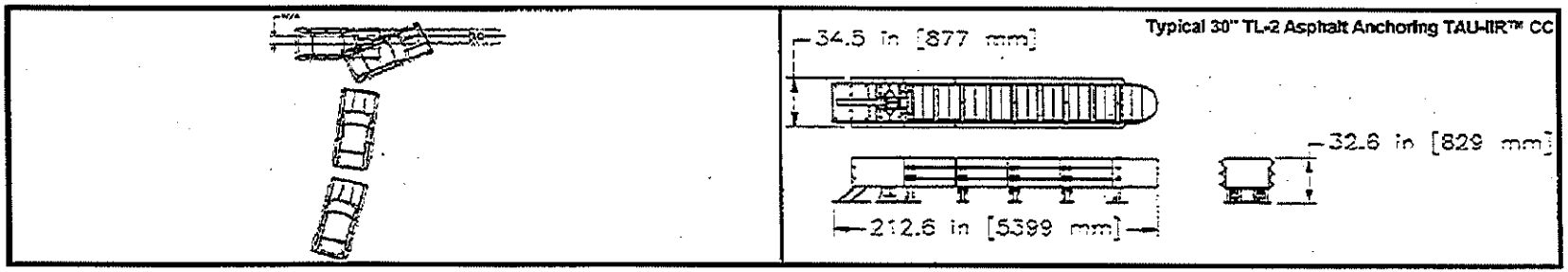
TITLE
UNIVERSAL TAU-IIR 30in TL-2 SYSTEM
COMPACT BACKSTOP, ASPHALT ANCHORING

SIZE	DWG NO.	REV
B	BSI-1012056-US	1

SCALE 1:25 SHEET 1 OF 1

Enclosure 3 (2 of 2)





Typical 30" TL-2 Asphalt Anchoring TAU-IIR™ CC

General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 2-30
Test No ..... STI Test # TAR10
Date 11/29/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-IIR
Dimensions ..... Length: 5.4 m (17.7 ft)
Size and/or dimension and material ..... Height: 829 mm (32.6 in)
of key elements ..... Width: 877 mm (34.5 in)

Test Vehicle

Type ..... Production Model
Designation 820C
Model ..... 1985 Honda CRX
Mass (kg)
Curb 772
Test Inertial 821
Dummy(s) 75
Gross Static 896

Impact Conditions

Speed (kph) 71
Angle (deg) 0
Impact Severity (kJ) 157.4

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 10
y-direction 1
Ridedown Acceleration (g's)
x-direction 16
y-direction 7

Test Article Deflection (mm)

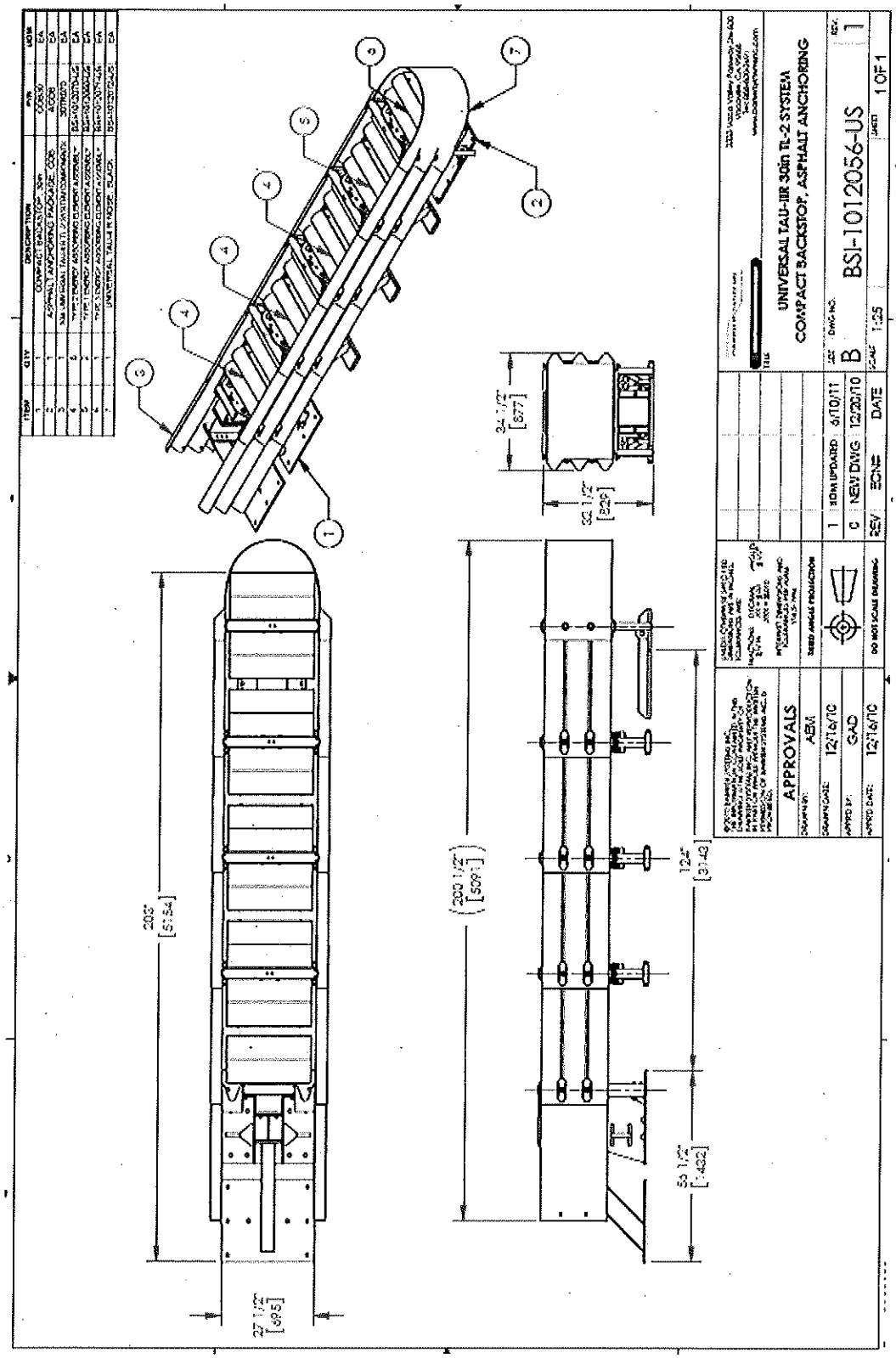
Dynamic ..... N/A
Permanent ..... N/A

Vehicle Damage

Exterior
VDS 12-FL-2
CDC 12FYEW1
Interior
OCDI FS0000000

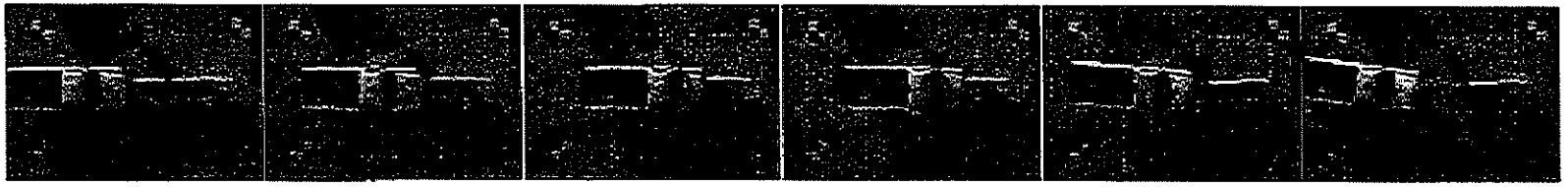
Post-Impact Vehicular Behavior (deg - gyro @ c.g)

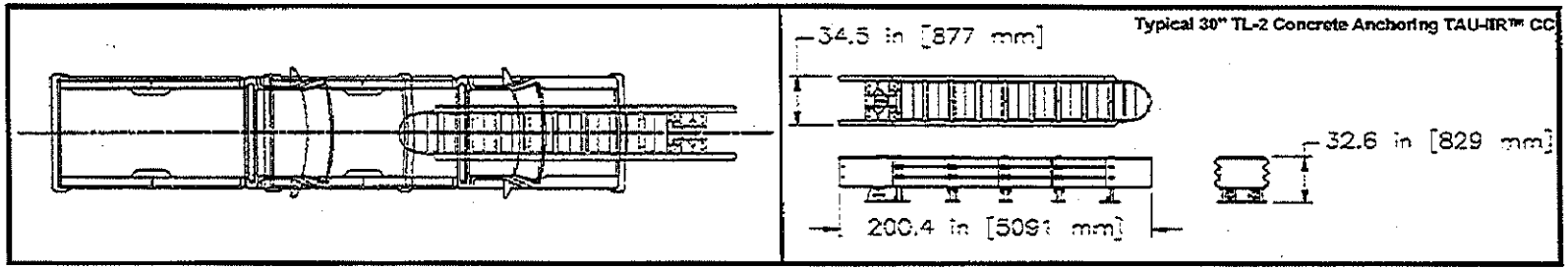
Maximum Roll Angle 8
Maximum Pitch Angle 2
Maximum Yaw Angle 80



Enclosure 4 (1 of 2)

Enclosure 4 (2 of 2)





General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 2-31
Test No. ..... STI Test # TAR11
Date 11/29/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-IIR
Dimensions ..... Length: 5.1 m (16.7 ft)
Size and/or dimension and material ..... Height: 829 mm (32.6 in)
of key elements ..... Width: 877 mm (34.5 in)

Test Vehicle

Type ..... Production Model
Designation 2000P
Model ..... 2004 Chevrolet 3/4 Ton Pickup
Mass (kg)
Curb 2260
Test Inertial 2013
Dummy(s) ..... N/A
Gross Static 2013

Impact Conditions

Speed (kph) 68
Angle (deg) 0
Impact Severity (kJ) 355.9

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 8
y-direction 0
Ridedown Acceleration (g's)
x-direction 20
y-direction 3

Test Article Deflection (mm)

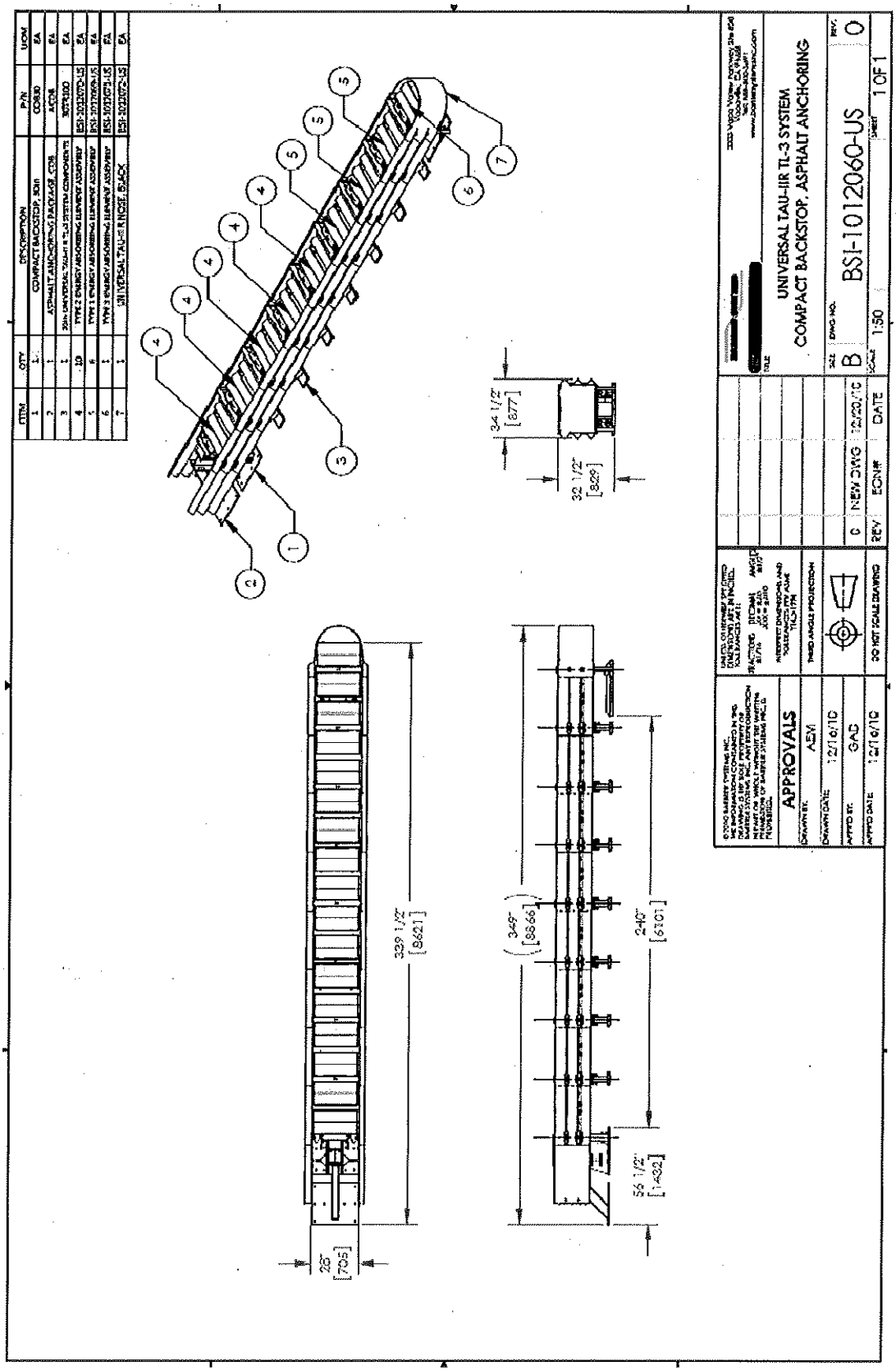
Dynamic ..... N/A
Permanent ..... N/A

Vehicle Damage

Exterior
VDS 12-FC-3
CDC 12FCEW1
Interior
OCDI FS0000000

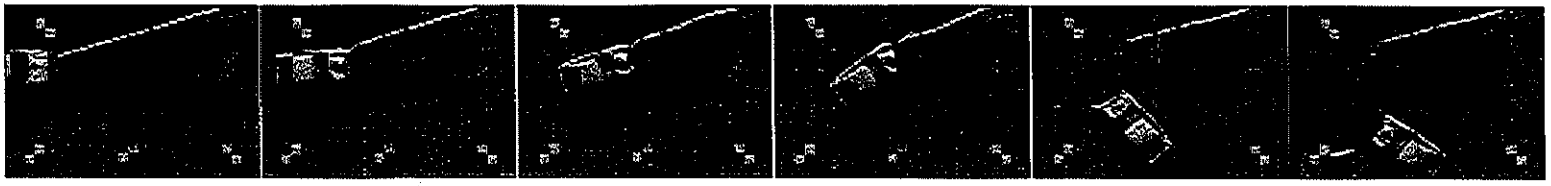
Post-Impact Vehicular Behavior (deg - gyro @ c.g)

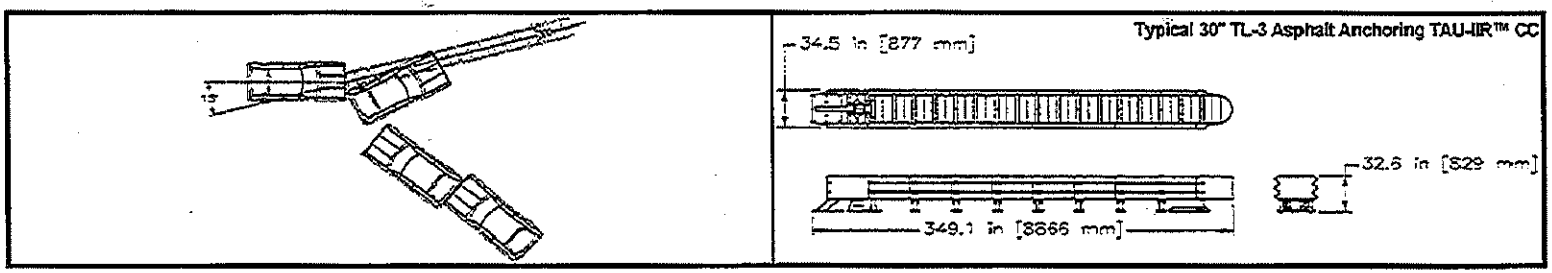
Maximum Roll Angle 1
Maximum Pitch Angle 7
Maximum Yaw Angle 7



Enclosure 5 (1 of 3)

Enclosure 5 (2 of 3)





General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 3-32
Test No ..... STI Test # TAR04
Date 11/10/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-IIR
Dimensions ..... Length: 8.9 m (29.1 ft)
Size and/or dimension and material of key elements ..... Height: 829 mm (32.6")
Width: 877 mm (34.5")

Test Vehicle

Type ..... Production Model
Designation 820C
Model ..... 1986 Honda CRX
Mass (kg)
Curb 836
Test Inertial 829
Dummy(s) 75
Gross Static 904

Impact Conditions

Speed (kph) 100
Angle (deg) 15
Impact Severity (kJ) 316.6

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 11
y-direction 0
Ridedown Acceleration (g's)
x-direction 12
y-direction 3

Test Article Deflection (mm)

Dynamic ..... N/A
Permanent ..... N/A

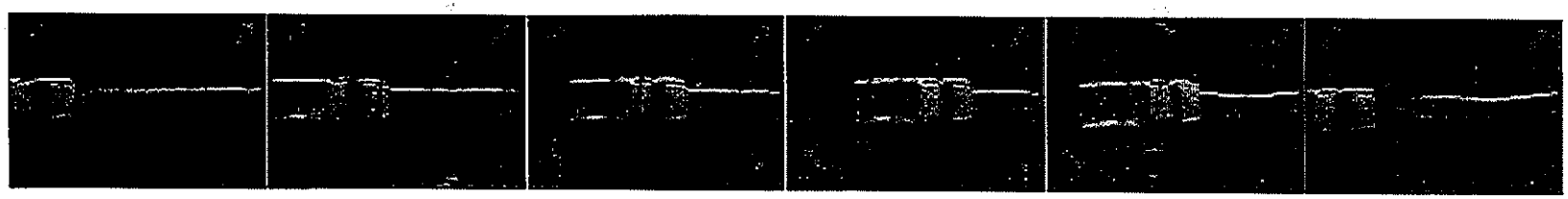
Vehicle Damage

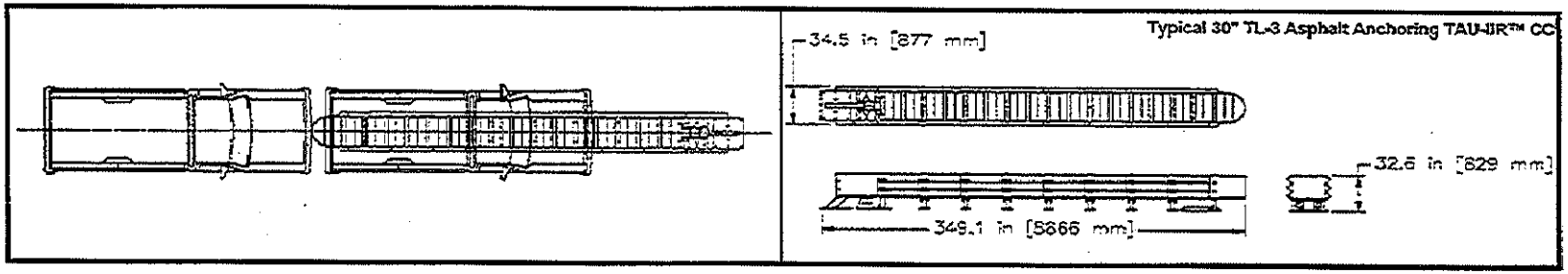
Exterior
VDS 11-FC-3
CDC 11FYEW2
Interior
OCDI LF1010000

Post-Impact Vehicular Behavior (deg - gyro @ c.g)

Maximum Roll Angle 14
Maximum Pitch Angle 5
Maximum Yaw Angle 137

Enclosure 5 (3 of 3)





General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 3-31
Test No ..... STI Test # TAR03
Date 11/8/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-IIR
Dimensions ..... Length: 8.9 m (29.1 ft)
Size and/or dimension and material ..... Height: 829 mm (32.6")
of key elements ..... Width: 877 mm (34.5")

Test Vehicle

Type ..... Production Model
Designation 2000P
Model ..... 2004 Chevrolet 3/4 Ton Pickup
Mass (kg)
Curb 2225
Test Inertial 2020
Dummy(s) ..... N/A
Gross Static 2020

Impact Conditions

Speed (kph) 100
Angle (deg) 0
Impact Severity (kJ) 776.0

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 9
y-direction 0
Ridedown Acceleration (g's)
x-direction 19
y-direction 3

Test Article Deflection (mm)

Dynamic ..... N/A
Permanent ..... N/A

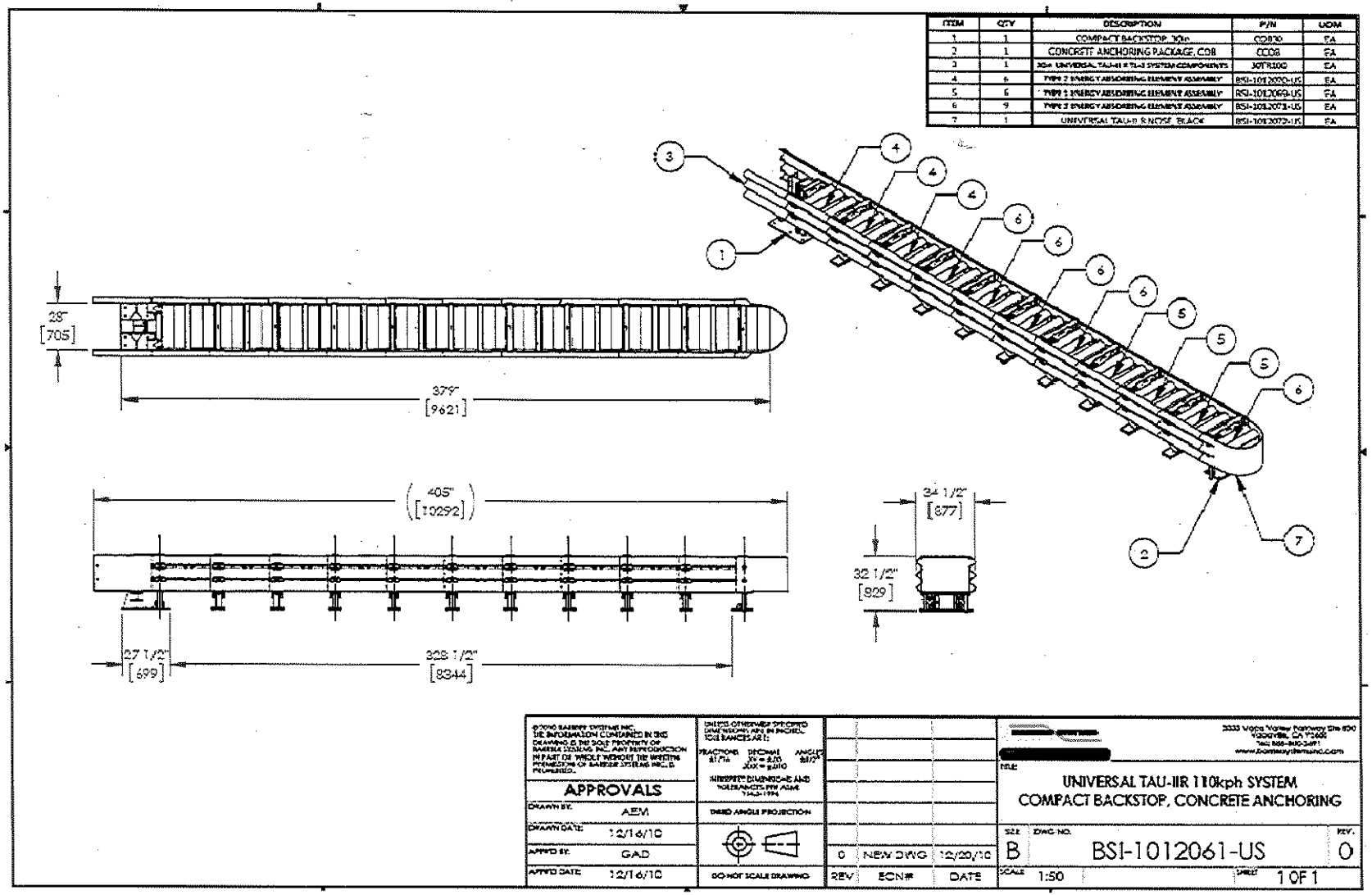
Vehicle Damage

Exterior
VDS 12-FC-2
CDC 12FDEW1
Interior
OCDI FS0000000

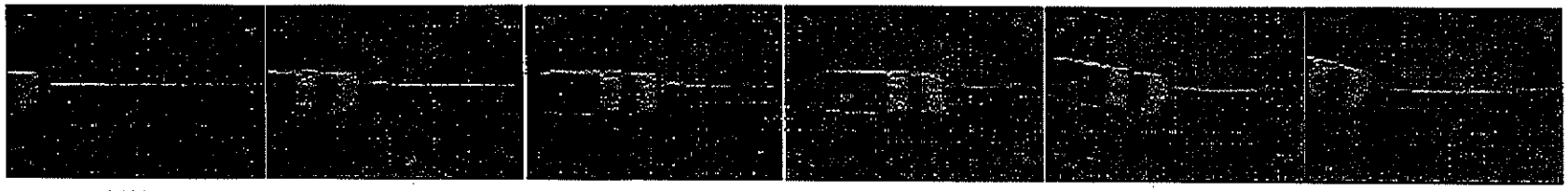
Post-Impact Vehicular Behavior (deg - gyro @ c.g)

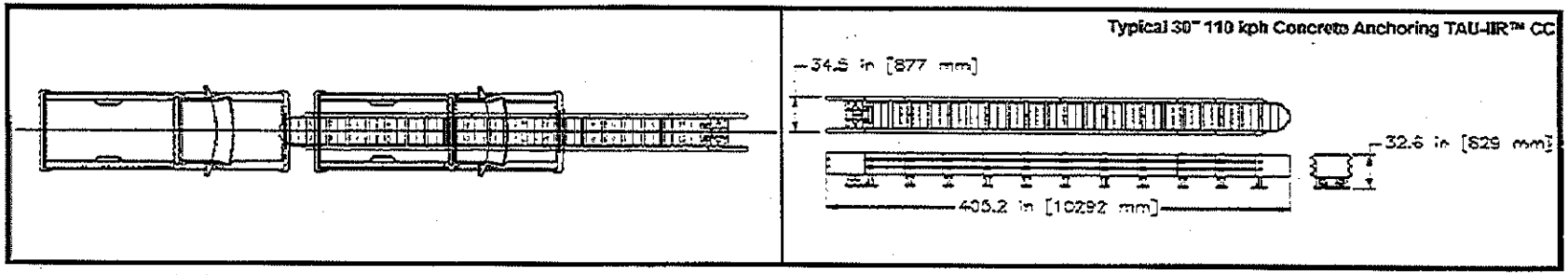
Maximum Roll Angle 4
Maximum Pitch Angle 14
Maximum Yaw Angle 2

Enclosure 6 (1 of 2)



Enclosure 6 (2 of 2)





General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 3-31 (Modified/110 kph)
Test No ..... STI Test # TAR12
Date 12/6/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-IIR
Dimensions ..... Length: 10.3 m (33.8 ft)
Size and/or dimension and material ..... Height: 829 mm (32.6 in)
of key elements ..... Width: 877 mm (34.5 in)

Test Vehicle

Type ..... Production Model
Designation 2000P
Model ..... 2000 Chevrolet 3/4 Ton Pickup
Mass (kg)
Curb 2177
Test Inertial 2013
Dummy(s) ..... N/A
Gross Static 2013

Impact Conditions

Speed (kph) 109
Angle (deg) 0
Impact Severity (kJ) 914.3

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 10
y-direction 0
Ridedown Acceleration (g's)
x-direction 17
y-direction 2

Test Article Deflection (mm)

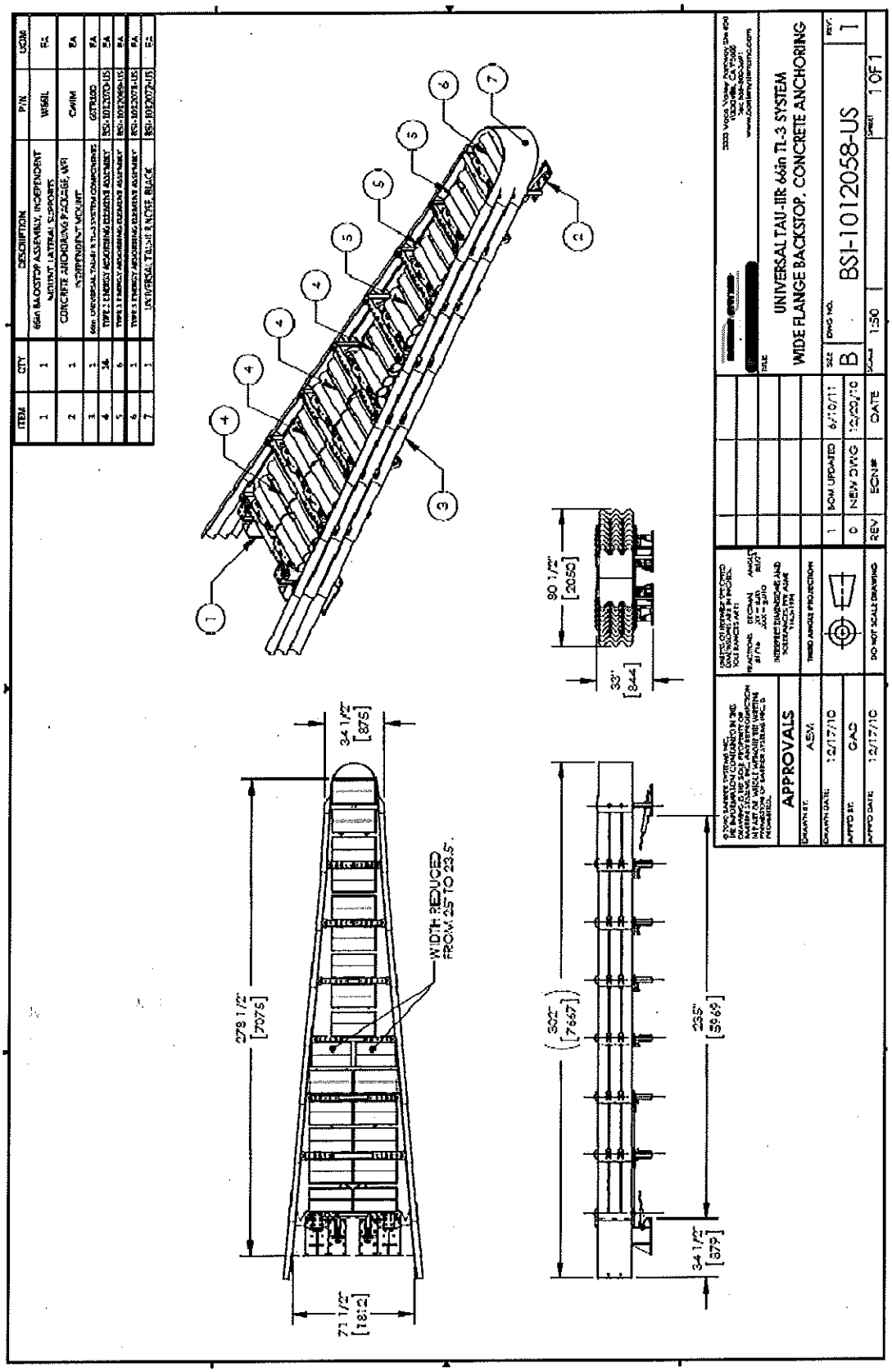
Dynamic ..... N/A
Permanent ..... N/A

Vehicle Damage

Exterior
VDS 12-FC-2
CDC 12FCEW1
Interior
OCDI FS0000000

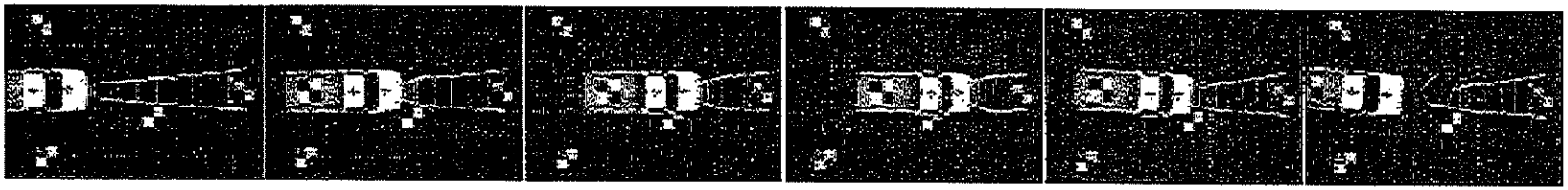
Post-Impact Vehicular Behavior (deg - gyro @ c.g)

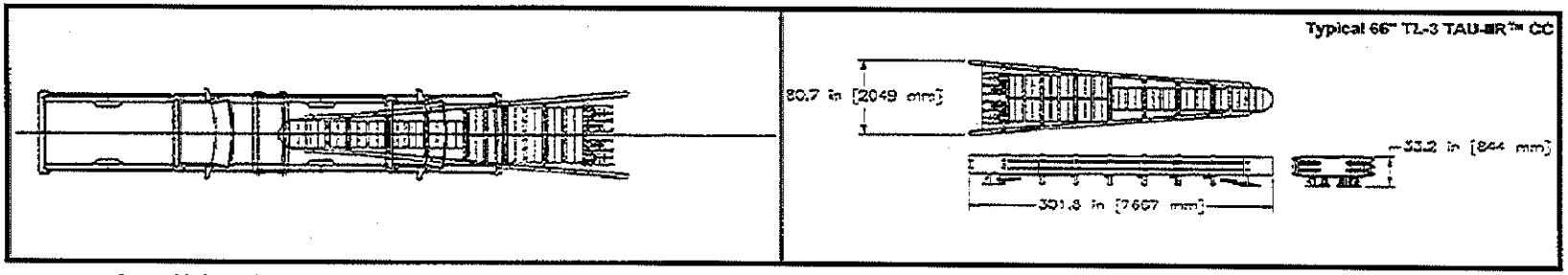
Maximum Roll Angle 11
Maximum Pitch Angle 3
Maximum Yaw Angle 12



Enclosure 7 (1 of 2)

Enclosure 7 (2 of 2)





General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 3-31
Test No. ..... STI Test # TAR13
Date 12/9/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-IIR
Dimensions ..... Length: 7.7 m (25.2 ft)
Size and/or dimension and material ..... Height: 844 mm (33.2 in)
of key elements ..... Width: 2049 mm (80.7 in)

Test Vehicle

Type ..... Production Model
Designation 2000P
Model ..... 2004 Chevrolet 3/4 Ton Pickup
Mass (kg)
Curb 2201
Test Inertial 2009
Dummy(s) ..... N/A
Gross Static 2009

Impact Conditions

Speed (kph) 102
Angle (deg) 0
Impact Severity (kJ) 806.2

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 9
y-direction 0
Ridedown Acceleration (g's)
x-direction 20
y-direction 3

Test Article Deflection (mm)

Dynamic ..... N/A
Permanent ..... N/A

Vehicle Damage

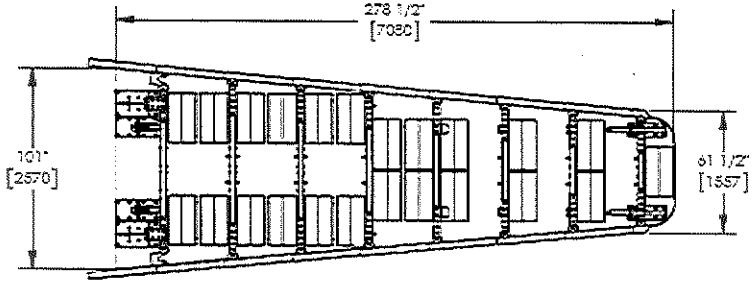
Exterior
VDS 12-FC-2
CDC 12FCEW1
Interior
OCDI FS0000000

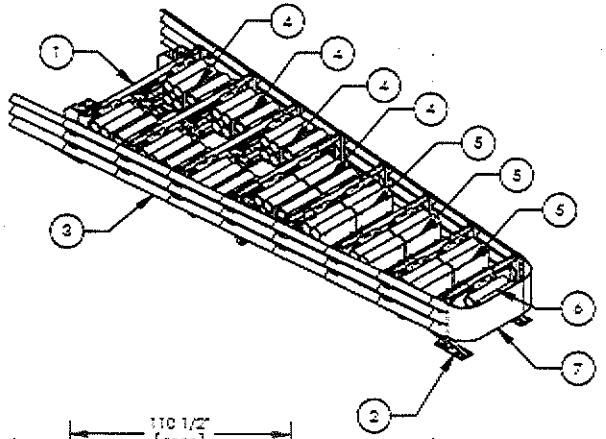
Post-Impact Vehicular Behavior (deg - gyro @ c.g)

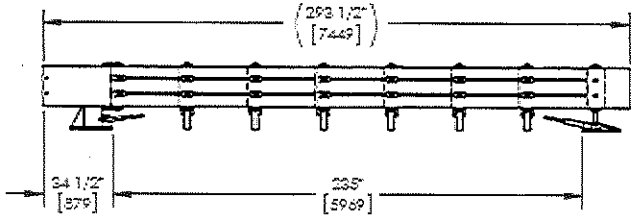
Maximum Roll Angle 2
Maximum Pitch Angle 7
Maximum Yaw Angle 5

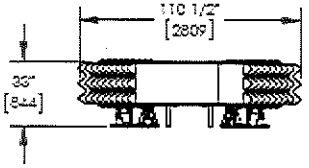
Enclosure 8 (1 of 3)

ITEM	QTY	DESCRIPTION	P/N	UOM
1	1	96in BACKSTOP ASSEMBLY, INDEPENDENT MOUNT, LATERAL SUPPORTS	W2661	EA
2	1	CONCRETE ANCHORING PACKAGE, 96in INDEPENDENT MOUNT	CW2M	EA
3	1	96in UNIVERSAL TAU-II TL-3 SYSTEM COMPONENTS	DISTRIBUTED	EA
4	24	TYPE 2 ENERGY ABSORBING ELEMENT ASSEMBLY	BSI-1012075-US	EA
5	6	TYPE 1 ENERGY ANCHORING ELEMENT ASSEMBLY	BSI-1012069-US	EA
6	1	TYPE 2 ENERGY ABSORBING ELEMENT ASSEMBLY	BSI-1012075-US	EA
7	2	UNIVERSAL TAU-II 8"WIDE NOSE, BLACK	BSI-1012075-US	EA









APPROVALS	
DRAWN BY:	ABM
DRAWN DATE:	12/17/10
APPRD BY:	GAD
APPRD DATE:	12/17/10

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

REV	ECN#	DATE
1	BOM UPDATED	6/10/11
0	NEW DWG	12/20/10

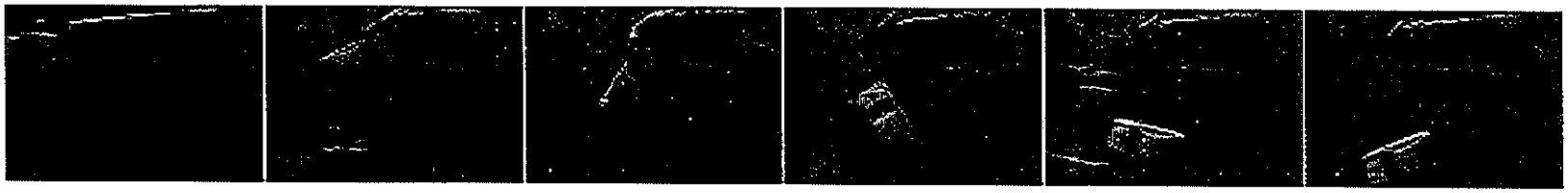
3333 Vista Valley Parkway Ste 600
Vacaville, CA 95688
Tel 888-400-3491
www.BarrierSystemsInc.com

TITLE: UNIVERSAL TAU-II® 96in TL-3 SYSTEM, WIDE FLANGE BACKSTOP, CONCRETE ANCHORING

SIZE	DWG NO.	REV.
B	BSI-1012059-US	1

SCALE: 1:50 SHEET: 1 OF 1

Enclosure 8 (2 of 3)



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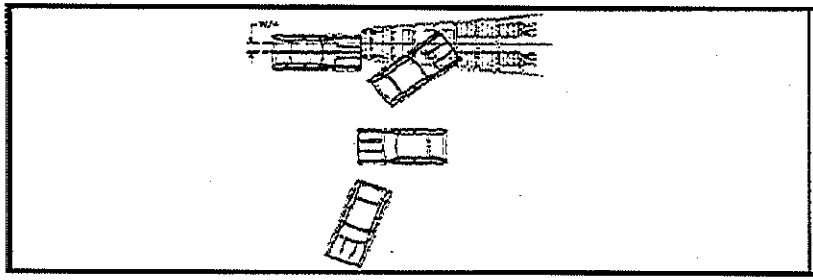
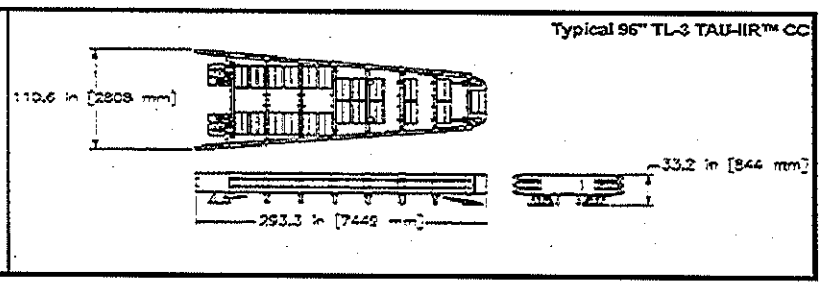




General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 3-30
Test No. ..... STI Test # TAR06
Date 11/17/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-II®
Dimensions ..... Length: 7.4 m (24.4 ft)
Size and/or dimension and material ..... Height: 844 mm (33.2 in)
of key elements ..... Width: 2808 mm (110.6 in)

Test Vehicle

Type ..... Production Model
Designation 820C
Model ..... 1986 Honda CRX
Mass (kg)
Curb 768
Test Inertial 817
Dummy(s) 75
Gross Static 892

Impact Conditions

Speed (kph) 100
Angle (deg) 0
Impact Severity (kJ) 315.0

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 12
y-direction 1
Ridedown Acceleration (g's)
x-direction 17
y-direction 7

Test Article Deflection (mm)

Dynamic ..... N/A
Permanent ..... N/A

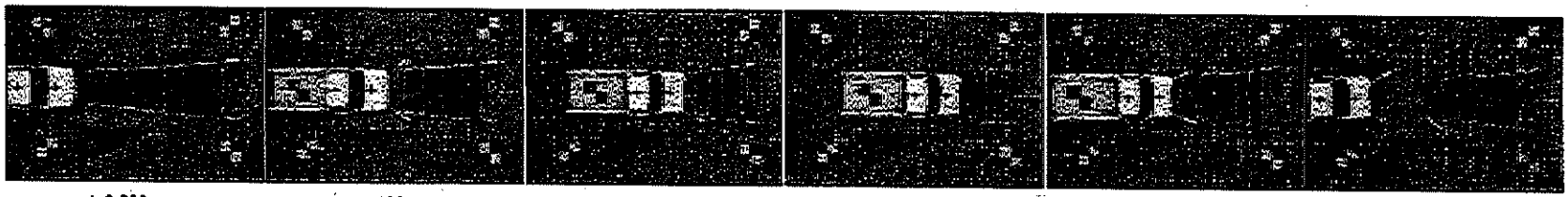
Vehicle Damage

Exterior
VDS 12-FL-5
CDC 12FYEW3
Interior
OCDI LF0000000

Post-Impact Vehicular Behavior (deg - gyro @ c.g)

Maximum Roll Angle 14
Maximum Pitch Angle 17
Maximum Yaw Angle 162

Enclosure 8 (3 of 3)



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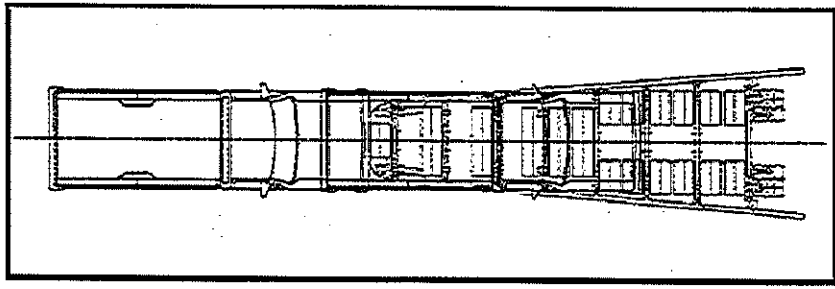

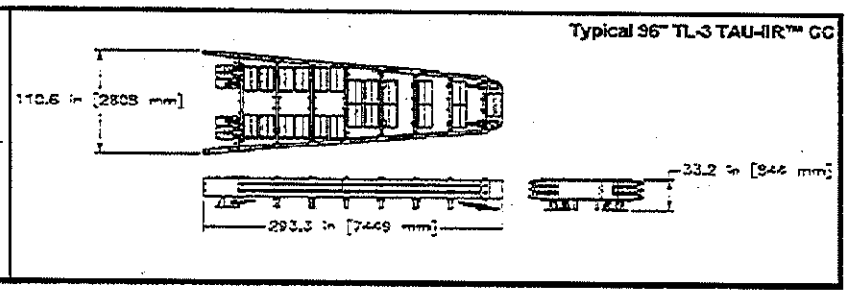

General Information

Test Agency ..... SAFE TECHNOLOGIES, INC.
Test Designation ..... NCHRP Report 350 3-31
Test No ..... STI Test # TAR07
Date 11/19/2010

Test Article

Type ..... Crash Cushion
Name ..... TAU-IIR
Dimensions ..... Length: 7.4 m (24.4 ft)
Size and/or dimension and material ..... Height: 844 mm (33.2 in)
of key elements ..... Width: 2808 mm (110.6 in)

Test Vehicle

Type ..... Production Model
Designation 2000P
Model ..... 2004 Chevrolet 3/4 Ton Pickup
Mass (kg)
Curb 2213
Test Inertial 2004
Dummy(s) ..... N/A
Gross Static 2004

Impact Conditions

Speed (kph) 99
Angle (deg) 0
Impact Severity (kJ) 751.7

Exit Conditions

Speed (kph) ..... N/A
Angle (deg) ..... N/A

Occupant Risk Values

Impact Velocity (m/s)
x-direction 10
y-direction 1
Ridedown Acceleration (g's)
x-direction 17
y-direction 3

Test Article Deflection (mm)

Dynamic ..... N/A
Permanent ..... N/A

Vehicle Damage

Exterior
VDS 12-FC-3
CDC 12FCEW1
Interior
OCDI FS0000000

Post-Impact Vehicular Behavior (deg - gyro @ c.g)

Maximum Roll Angle 3
Maximum Pitch Angle 22
Maximum Yaw Angle 2