



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

February 5, 2007

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

In Reply Refer To:
HSSD/SS-145

Mr. Terry Bell
SteelCity Partners
21 Manor Drive
Grove City, PA 16127

Dear Mr. Bell:

Thank you for your mail correspondence of September 22, 2006, requesting the Federal Highway Administration's (FHWA) acceptance of your company's Fundaflex™ MA60 MarkII Sign Support system for use on the National Highway System (NHS). Accompanying your letter was a report on testing of this roadside hardware conducted by the Texas Transportation Institute and test videos. You requested that we find it acceptable for use on the National Highway System under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Requirements

Sign supports should meet the guidelines contained in the NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features". The FHWA Memorandum "Action: Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing of sign and luminaire supports.

Product description

The Steel City Partners Sign Support system consists of 2 in. (50.8 mm) diameter schedule 40 pipe. Three set screws in the proprietary base assembly are tightened to 35 ft-lbs (4.84 kg-m). The base assembly consists of a casting with three set screws with a center cable passing through a dust boot, top steel plate, power section (PUR/Cellasto), and anchored below the bottom steel plate. In nuisance type impacts, the power section is designed to elastically collapse and then return the sign support to the vertical position.



Test article installations

In the test installations a 36 inch (914 mm) metal stop sign was mounted at 7 ft (2.1 m) to the bottom of the sign.

For the low speed test (NCHRP 350 Test Level 3-60), a single sign was erected with the sign panel facing the impacting vehicle and being struck by the left quarter point of the impacting vehicle.

For the high speed test (NCHRP 350 Test Level 3-61), the first sign was installed facing the impacting vehicle and being struck by the right quarter point of the impacting vehicle while the second sign installation was 15 ft and 28 in. (5.28 m) offset from the first sign installation to be impacted by the opposite quarter point of the impacting vehicle. The sign panel of the second sign was turned 90 degrees.

Testing

Full-scale automobile testing which included the NCHRP report 350 Test 3-60 (low-speed test) and the NCHRP Report 350 Test 3-61 (high speed test) was conducted on your company's FundaFlex™ MA60 MarkII Sign Support system. The complete device as tested is shown in the Enclosure 1.

The NCHRP Report 350 test 3-60 involved an 820 kg passenger car (820C) impacting the FundaFlex™ MA60 MarkII Sign Support head-on with the left quarter point of the vehicle aligned with the centerline of the mailbox column at impact speed and angle of 34.9 km/h and 0.3 degrees, respectively.

The NCHRP Report 350 tests 3-61 involved an 820 kg passenger car (820C) impacting the FundaFlex™ MA60 MarkII Sign Support head-on with the right quarter point of the vehicle aligned with the centerline of the FundaFlex™ MA60 MarkII Sign Support at impact speed and angle of 100.5 km/h and 0 degrees, respectively.

You also conducted an additional test which involved the same 820C vehicle impacting the FundaFlex™ MA60 MarkII Sign offset 15 ft and 28 in. (5.28 m) back from the NCHRP Report 350 tests 3-61 sign installation (as described above). It was expected to impact the left quarter point of the impacting vehicle at 90 degrees angle. Due to the effect of the first impact, the actual impact in this test occurred at a nominal impact speed of 92.1 km/h and at the point somewhat shifted to the left of the left quarter point of the vehicle. While this test could not qualify as the NCHRP 350 test 3-61, it was not required for your sign support as a system with symmetrical breakaway mechanism.

Findings

In the NCHRP Report 350 Test 3-60 (low-speed test), your company's FundaFlex™ MA60 Mark II Sign Support system activated by yielding to the vehicle. No detached elements, fragments, or other debris was present to penetrate, or to show potential for penetrating the occupant compartment or to present hazard to others in the area. No occupant compartment

deformation occurred. The vehicle remained upright during and after the collision event. Occupant risk factors were within the preferred limits. Summary of test results is provided in Enclosure 2.

In the NCHRP Report 350 Test 3-61 (high speed test), your company's FundaFlex™ MA60 Mark II Sign Support system activated by pulling out of the base. Both first and second sign supports pulled out of the bases and rode along with the vehicle. This was not the manner in which the device was intended to activate, however the excess of the designed "flex" of the system is acceptable in a high speed test. The pulled out sign supports did not penetrate nor show potential for penetrating the occupant compartment, nor did they present undue hazard to others in the area. Maximum occupant compartment deformation was caused by the second sign support installation and measured 2.2 in. (56 mm) in the roof area. The vehicle remained upright during and after the impact. Occupant risk factors were within the required limits. Summary of test results is provided in Enclosure 2.

The results of testing met the FHWA requirements and, therefore, the FundaFlex™ MA60 MarkII Sign Support system described above and shown in the enclosed drawings for reference is acceptable for use as the NCHRP Report 350 Test Level 3 device on the NHS, when selected by the contracting authority, subject to the provisions of Title 23, Code of Federal Regulations, Section 635.411 as they pertain to proprietary products.

Standard provisions

Please note the following standard provisions that apply to the 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 MUTCD.
- Any changes that may adversely influence the crashworthiness of the device 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 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 they will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number SS-145 shall not be reproduced except in full. As this letter and the documentation which support it become public information, it will be available for inspection at our office by interested parties.
- The FundaFlex™ MA60 MarkII Sign Support System is a patented product and is considered "proprietary". The use of proprietary devices specified on Federal-aid projects, except exempt, non-NHS projects: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are

essential for synchronization with 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, a copy of which is enclosed.

Sincerely yours,

/original signed by/

John R. Baxter, P.E.
Director, Office of Safety Design
Office of Safety

Enclosures

FHWA:HSSD:NArtimovich:tb:x61331:1/26/07
File: s://directory folder/nartimovich/SS145-Fundalex MA60SupportSystemFIN.doc
cc: HSSD (Reader, HSA; Chron File, HSSD; NArtimovich, HSSD;
MMcDonough, HSSD)

Title 23, Code of Federal Regulations
§ 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State transportation department certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State transportation department wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State transportation department may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.

(f) In the case of a design-build project, the following requirements apply: Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the Request for Proposals document unless the conditions of paragraph (a) of this section are applicable.

[41 FR 36204, Aug. 27, 1976, as amended at 67 FR 75926, Dec. 10, 2002]

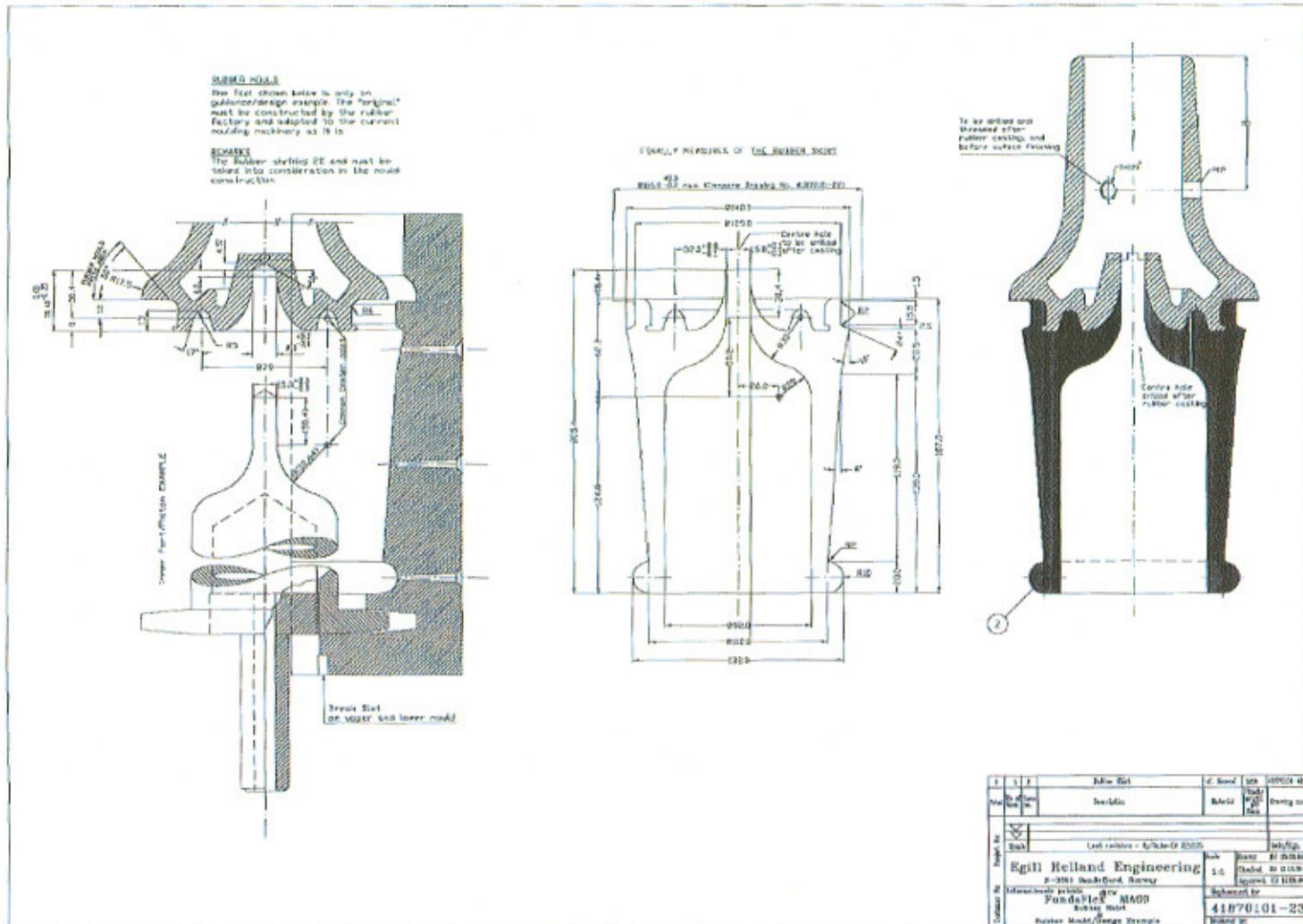


Figure 3. Details of the Steel City Partners' FundaFlex™ MA60 Mark II sign system – rub skirt and mould.

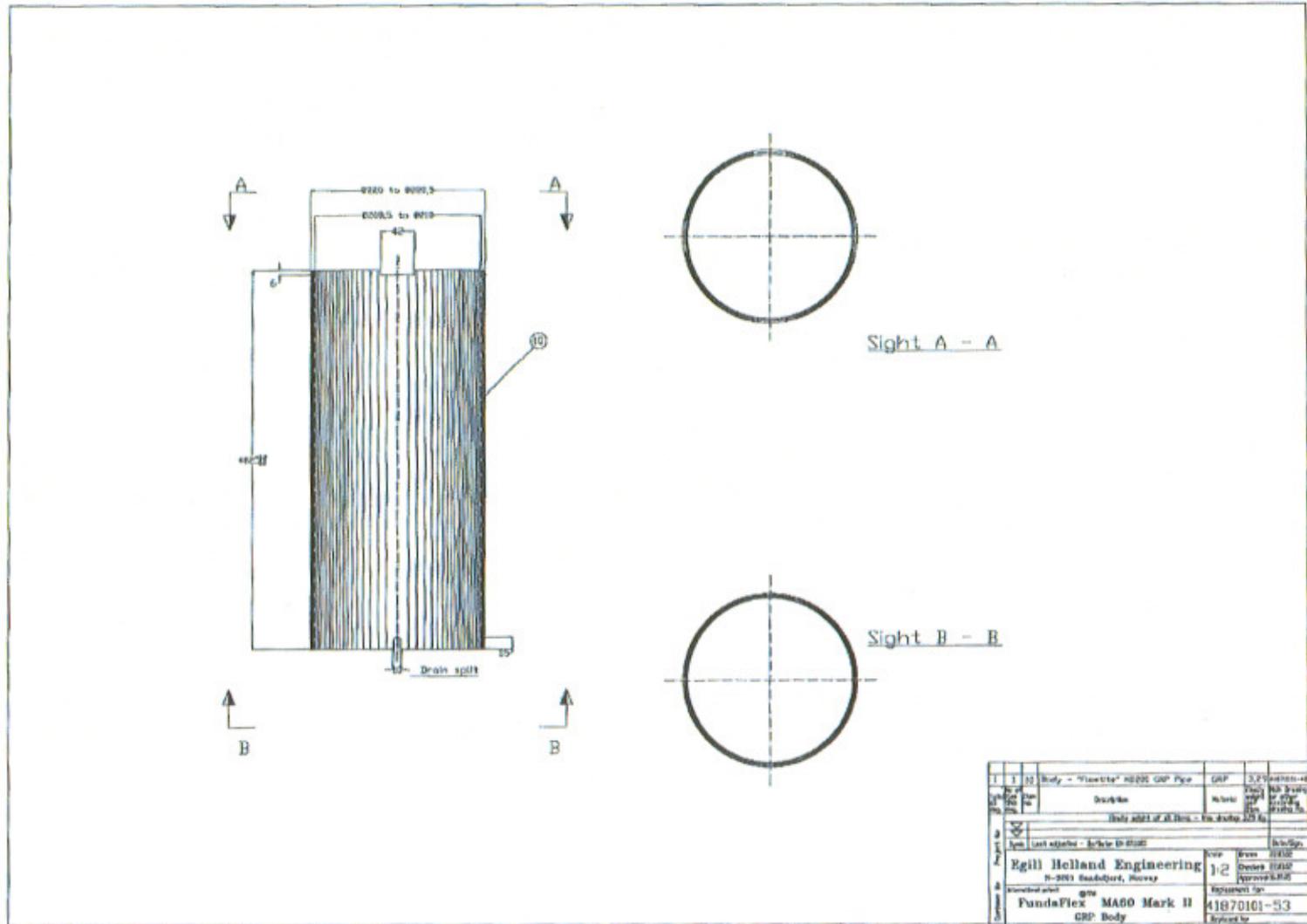
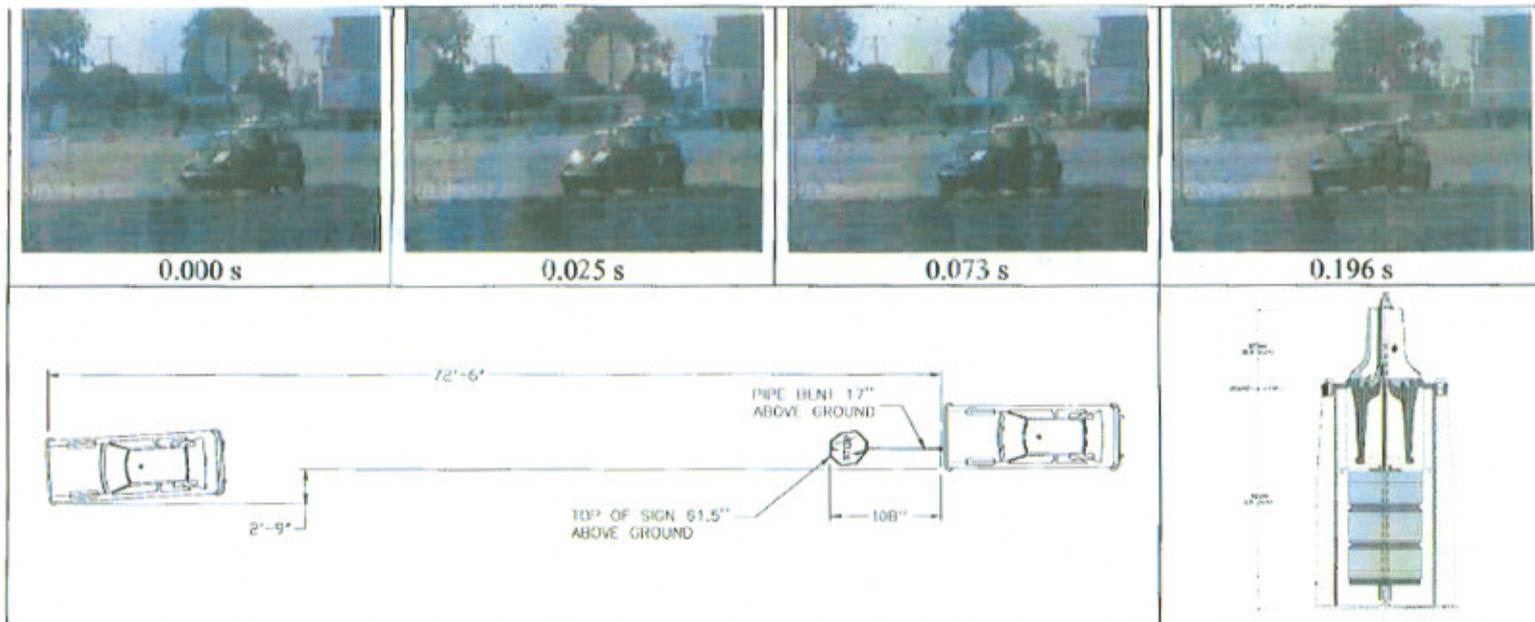
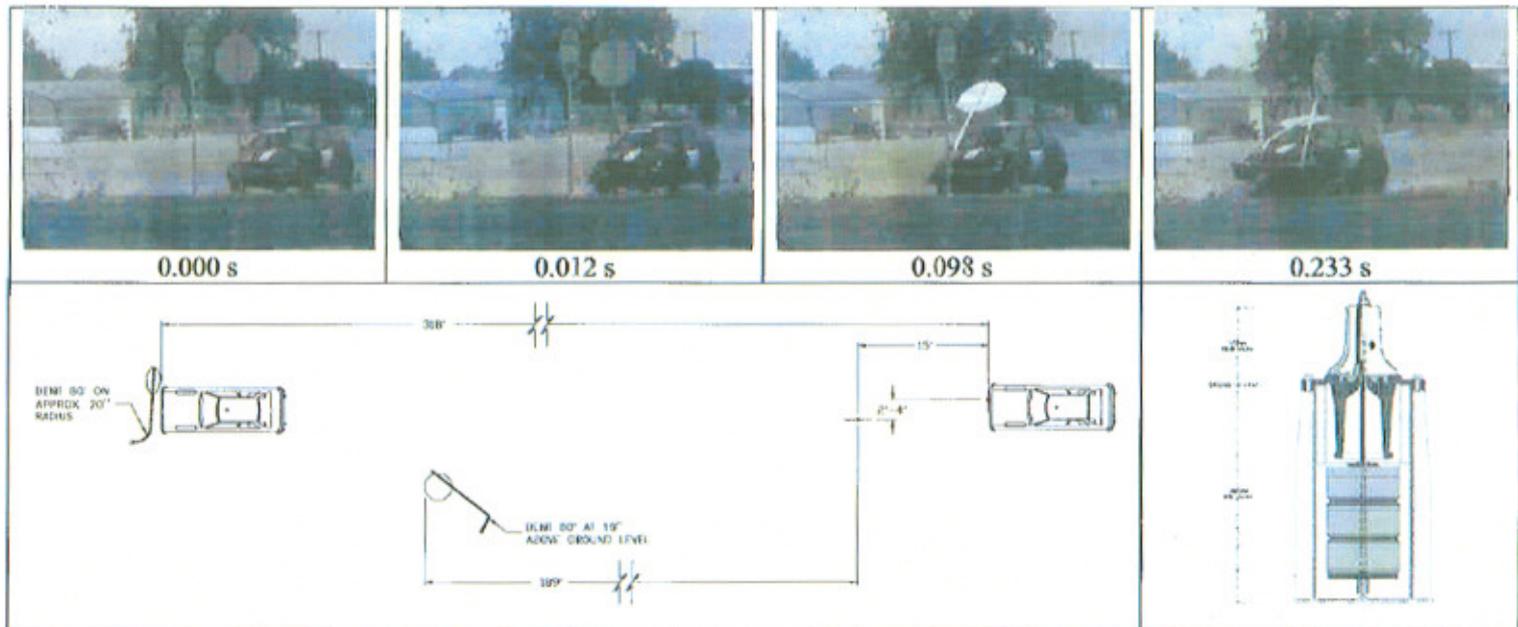


Figure 8. Details of the Steel City Partners' FundaFlex™ MA60 Mark II sign system – GRP body #2



General Information		Impact Conditions		Test Article Deflections (m)	
Test Agency.....	Texas Transportation Institute	Speed (km/h)	35.2	Dynamic	N/A
Test No.	400001-SCP1	Angle (deg)	0.3	Permanent	N/A
Date	07-12-2006	Exit Conditions		Working Width	N/A
Test Article		Speed (km/h)	27.0	Vehicle Damage	
Type	Sign Support	Angle (deg)	N/A	Exterior	
Name	FundaFlex™ MA60 Mark II Sign System	Occupant Risk Values		VDS	12FC0
Installation Length (m)	N/A	Impact Velocity (m/s)		CDC	12FCEN0
Material or Key Elements	Schedule 40 Pipe In Base with Cable, Dust Boot, Steel Plates, & Power Section	Longitudinal	2.3	Max. Exterior Vehicle Crush (mm)	None
Soil Type and Condition	Standard Soil, Dry	Lateral	0.4	Interior	
Test Vehicle		THIV (km/h)	8.3	OCDI	FS0000000
Type	Production	Ridedown Accelerations (g's)		Max. Occupant Compartment Deformation (mm)	None
Designation	820C	Longitudinal	-1.4	Post-Impact Behavior	
Model	1996 Chevrolet Metro	Lateral	0.7	(during 1.0 sec after impact)	
Mass (kg)		PHD (g's)	1.4	Max. Yaw Angle (deg)	-1.8
Curb	805	ASI	0.16	Max. Pitch Angle (deg)	3.2
Test Inertial	820	Max. 0.050-s Average (g's)		Max. Roll Angle (deg)	2.8
Dummy	77	Longitudinal	-1.8		
Gross Static	897	Lateral	-0.3		
		Vertical	-0.9		

Figure 17. Summary of results for NCHRP Report 350 test 3-60 on the Steel City Partners' FundaFlex™ MA60 Mark II sign system .



General Information		Impact Conditions		Test Article Deflections (m)	
Test Agency.....	Texas Transportation Institute	Speed (km/h)	100.5	Dynamic	N/A
Test No.	400001-SCP2	Angle (deg)	0	Permanent.....	N/A
Date	07-12-2006	Exit Conditions		Working Width.....	N/A
Test Article		Speed (km/h)	N/A	Vehicle Damage	
Type.....	Sign Support	Angle (deg)	N/A	Exterior	
Name	FundaFlex™ MA60 Mark II Sign System	Occupant Risk Values		VDS.....	12FL2 & 12FR2
Installation Length (m).....	N/A	Impact Velocity (m/s)		CDC	12FLHN2 12FREN2
Material or Key Elements	Schedule 40 Pipe In Base with Cable, Dust Boot, Steel Plates, & Power Section	Longitudinal	3.6 ✓	Max. Exterior Vehicle Crush (mm)	140
Soil Type and Condition		Lateral	0.3	Interior	
Standard Soil, Dry		THIV (km/h)	13.1	OCDI	FS0100010
Test Vehicle		Ridedown Accelerations (g's)		Max. Occupant Compartment Deformation (mm).....	56
Type.....	Production	Longitudinal	-2.4	Post-Impact Behavior	
Designation.....	820C	Lateral	1.1	(during 1.0 sec after impact)	
Model.....	1996 Chevrolet Metro	PHD (g's)	2.5	Max. Yaw Angle (deg).....	3.4
Mass (kg)		ASI	0.28	Max. Pitch Angle (deg).....	3.8
Curb.....	805	Max. 0.050-s Average (g's)		Max. Roll Angle (deg).....	3.3
Test Inertial.....	820	Longitudinal	-2.9		
Dummy.....	77	Lateral	0.5		
Gross Static.....	897	Vertical	-1.8		

Figure 24. Summary of results for NCHRP Report 350 test 3-61 on the Steel City Partners' FundaFlex™ MA60 Mark II sign system.

Title 23, Code of Federal Regulations
§ 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State transportation department certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State transportation department wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State transportation department may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.

(f) In the case of a design-build project, the following requirements apply: Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the Request for Proposals document unless the conditions of paragraph (a) of this section are applicable.

[41 FR 36204, Aug. 27, 1976, as amended at 67 FR 75926, Dec. 10, 2002]