October 6, 2004

Refer to: HSA-10/WZ-188

Mr. William Snook
The Traffic Safety Store
P.O. Box 33
Chadds Ford, Pennsylvania 19317

Dear Mr. Snook:

This is in response to the letter of August 5, 2004, requesting Federal Highway Administration (FHWA) acceptance of the New Sentry™ longitudinal channelizing barricade (LCB) as a test level 1 (TL-1) crashworthy traffic control device for use in work zones on the National Highway System (NHS). It was requested that we find these devices acceptable for use on the NHS based on its similarity to the previously tested "Off-the-Wall" LCB, under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Introduction

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "INFORMATION: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices are those lightweight devices which are to be self-certified by the vendor, Category II devices are other lightweight devices which need individual crash testing but with reduced instrumentation, Category III devices are barriers and other fixed or heavy devices also needing crash testing with normal instrumentation, and Category IV devices are trailer mounted lighted signs, arrow panels, etc. for which crash testing requirements have not yet been established. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

The New Sentry™ LCB units are rotationally molded of low density polyethylene (LDPE) and are 36 inches tall and 48 inches long, weighing 50 pounds empty. The wall thickness is a nominal 0.20 inches. The units are 20 inches wide at the base, tapering to 10 inches wide at the top. They can be filled with up to 100 gallons of water for a total weight of 884 pounds per unit. Patented U-shaped connectors are used to keep adjacent units together and prevent movement during minor hits.

Testing

The New Sentry™ is comparable in design to the crash-tested LCB, the MB-48x40 Multi-Barrier. The Multi-Barrier LCB units are also rotationally molded of LDPE and are 48 inches tall and 40 inches long, weighing 50 pounds empty. The wall thickness is also 0.20 inches, however the profile is different, ranging from 23 inches wide at the base to 6 inches wide at the top. The Multi-Barrier can also be filled with up to 100 gallons of water. Full-scale automobile testing was conducted on the Multi-Barrier and reported in the FHWA acceptance letter WZ-135 as a TL-1 (50 km/hr) Longitudinal Channelizing Barricade. The crash test matrix was a modification of both the NCHRP Report 350 tests for longitudinal barriers and work zone traffic control devices. The pick up truck and small car crash tests were conducted as if the test article was a redirective barrier, but it was understood that the LCB would allow penetration by the test vehicle. The results are summarized in the table below:

Test Number	10-9718-002	10-9718-003
NCHRP 350 Test #	1-10 (Pick Up Truck)	1-11 (Small Car)
Test Article	**Off-The-Wall Multi-Barrier MB 48x48**	
Length of test article	30 Sections (30.5 m, 100 ft)	30 Sections (30.5 m, 100 ft)
Mass of individual units	22.7 kg (50 pounds)	22.7 kg (50 pounds)
Mass of water ballast	418 kg (921 pounds)	418 kg (921 pounds)
Vehicle inertial mass	2011 kg (4433 pounds)	826 kg (1820 pounds)
Impact speed	51.25 km/h (31.8 mph)	49.16 km/h (30.5 mph)
Impact angle	25.0 degrees	20.2 degrees
Occupant impact speed	4.78 m/s	6.78 m/s
Ridedown acceleration	-3.45 g's	-3.77 g's
Trajectory	Vehicle penetrated, stopped	Vehicle penetrated system
Vehicle damage	Minor, to grill and hood	Minor, to grill and hood
Occup. compartment intrusion	None	None
Windshield damage	No Contact	No Contact

Findings

As expected the vehicle penetrated the installation. The occupant impact velocity of the small car exceeded that for a work zone traffic control device, but the occupant impact velocities and accelerations in both tests were within those specified for a barrier. The results of the testing met the unique requirements established for water-filled LCBs and, therefore, were found acceptable for use. You have received permission from Off-the-Wall Products to use the information from the Multi-Barrier crash tests to support the request for acceptance. In addition, it was requested that certain polyethylene plastics from Exxon Chemical Americas or Equistar Chemicals be allowed as alternate materials. We concur in this request, and will retain the product information on file.

We concur in the assertion that the New Sentry™ LCB, which is 12 inches shorter in height and 8 inches longer in length than the Multi-Barrier, should perform in similar manner to the tested Multi-Barrier. It was also indicated that this may be considered a temporary situation as Off-the-Wall Products intends to conduct TL-3 testing on the New Sentry™ LCB system in the near future. Therefore, the New Sentry™ LCB described above and detailed in the enclosed drawings are acceptable for use on the NHS as the NCHRP Report 350 TL-1 device when proposed by a State.

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 Manual on Uniform Traffic Control Devices.
- 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 WZ-188 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 New Sentry™ LCB is a patented device and is considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are *selected by the contractor* for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are *specified by a highway agency* for use on Federal-aid projects they: (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. These provisions do not apply to exempt non-NHS projects. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the

candidate device, 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,

/***Original Signed by***/

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

Enclosures

FHWA:HSA-10:NArtimovich:tb:x61331:10/4/04
File: h://directory folder/nartimovich/WZ188-NewSentryFIN
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
N. Artimovich, HSA-10)

Sec. 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 highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

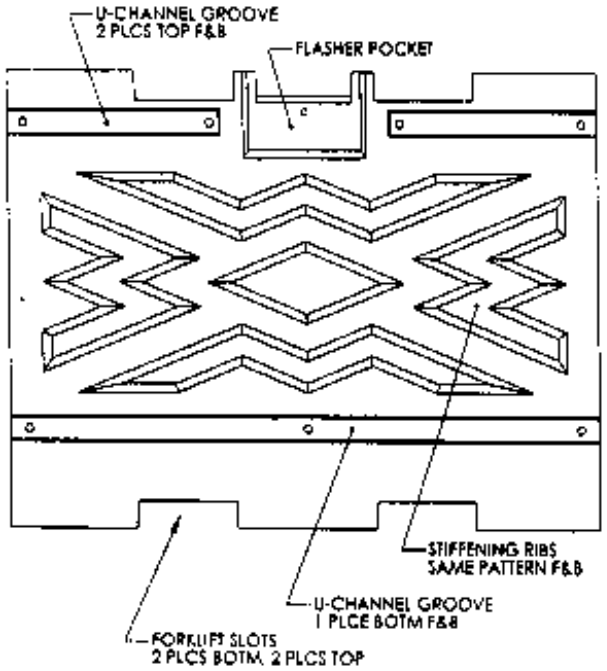
(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(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 highway agency 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 highway agency 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.

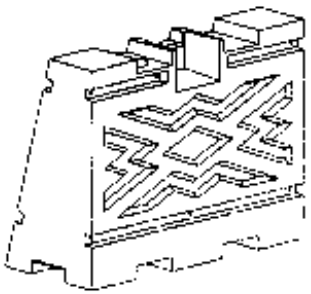
(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

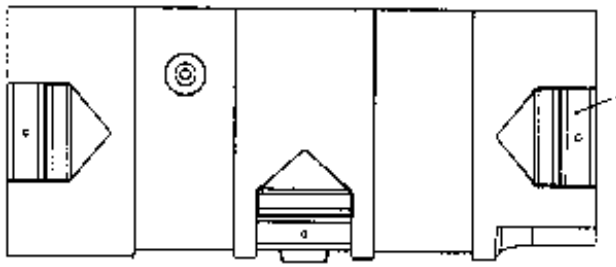
(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.



NOTES:

1. NOMINAL VALUES (UOS):
   (APPLY TO FEATURES AS NEEDED -
   MAY NOT BE SHOWN ON DRAWINGS)
   OUTSIDE RADII = .125, INSIDE RADII = .312
   OUSIDE WALL DRAFTS = 0 DEG, INSIDE = 1.5 DEG
   NOM WALL THICKNESS = .200
2. WITH .20 WALL, PART USES APPROX 1423 CU-IN OF RESIN (= ~48 LB LLDPE)
3. CONNECTOR RECEIVER FITS STANDARD OFF THE WALL U-CONNECTOR
4. STD SCREW INSERTS:
   1/4 - 20 X .50 DEEP
5. ALL DIMENSIONS REFERENCED TO OUTER SURFACE OF PART UOS





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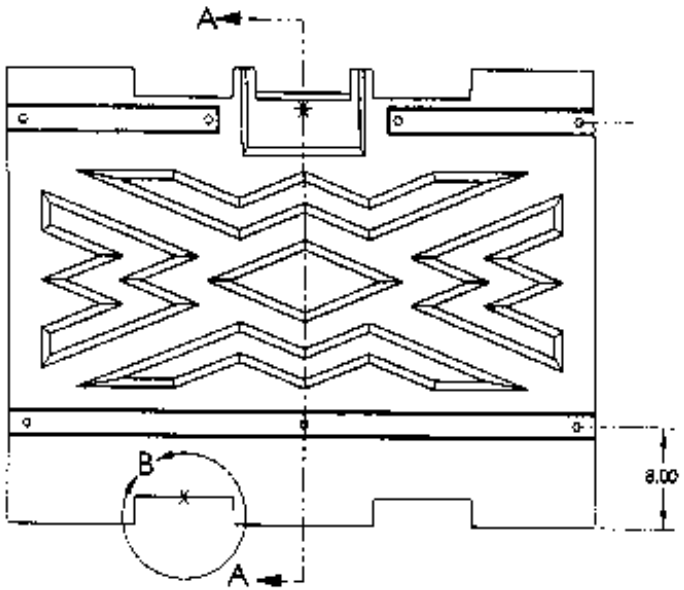
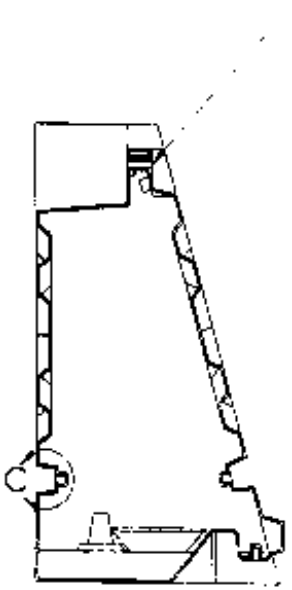
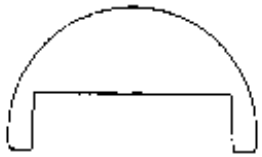
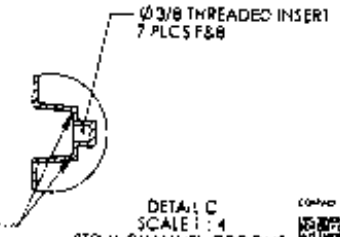




SECTION A-A



DETAIL B
SCALE 1 : 4
STD FORKLIFT SLOT



DETAIL C
SCALE 1 : 4
STD U-CHANNEL GROOVE

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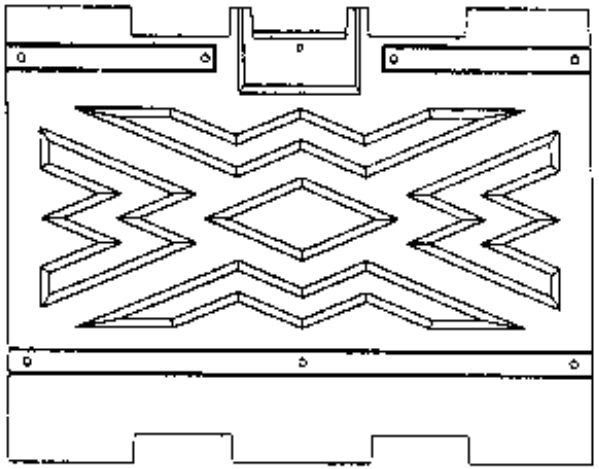
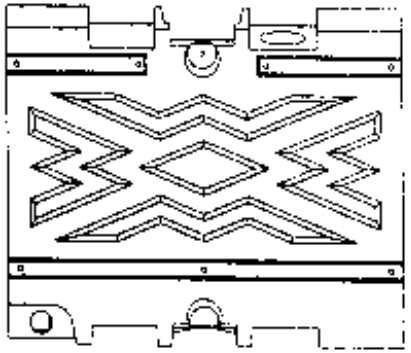
VIEW NORMAL TO VERTICAL (FRONT) FACE



VIEW NORMAL TO ANGLED (REAR) FACE
(1:12 SCALE)



NOTES:

1) ALL RIBS ARE 1.00 IN DEEP, 35.0° INWARD DRAFT (PER SIDE)

2) ASSUME NOMINAL INSIDE & OUTSIDE RADII ON PATTERN RIBS (REFER TO SHEET 1)

3) RIB PATTERN IS SAME ON BOTH F&B FACES

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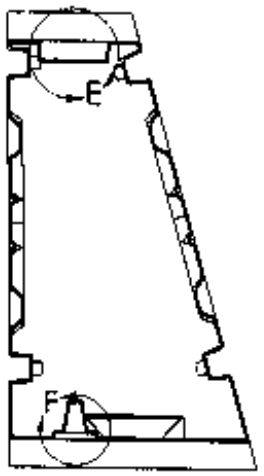
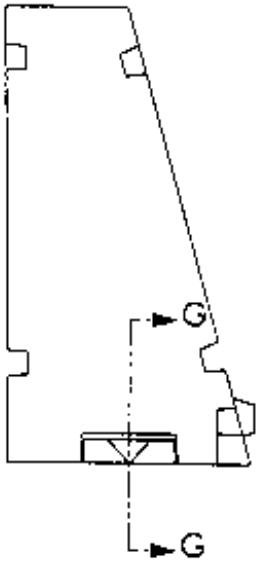
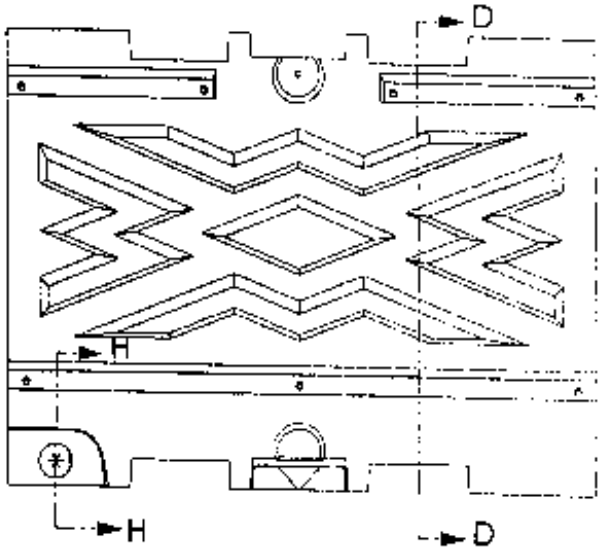
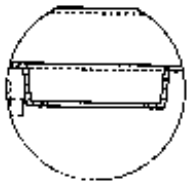


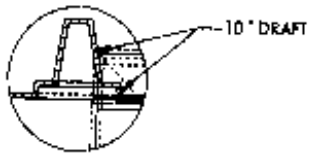
SECTION D-D



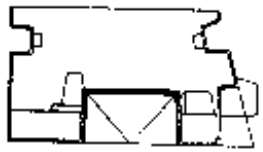




DETAIL E
SCALE 1 : 4



DETAIL F
SCALE 1 : 4



SECTION H-H

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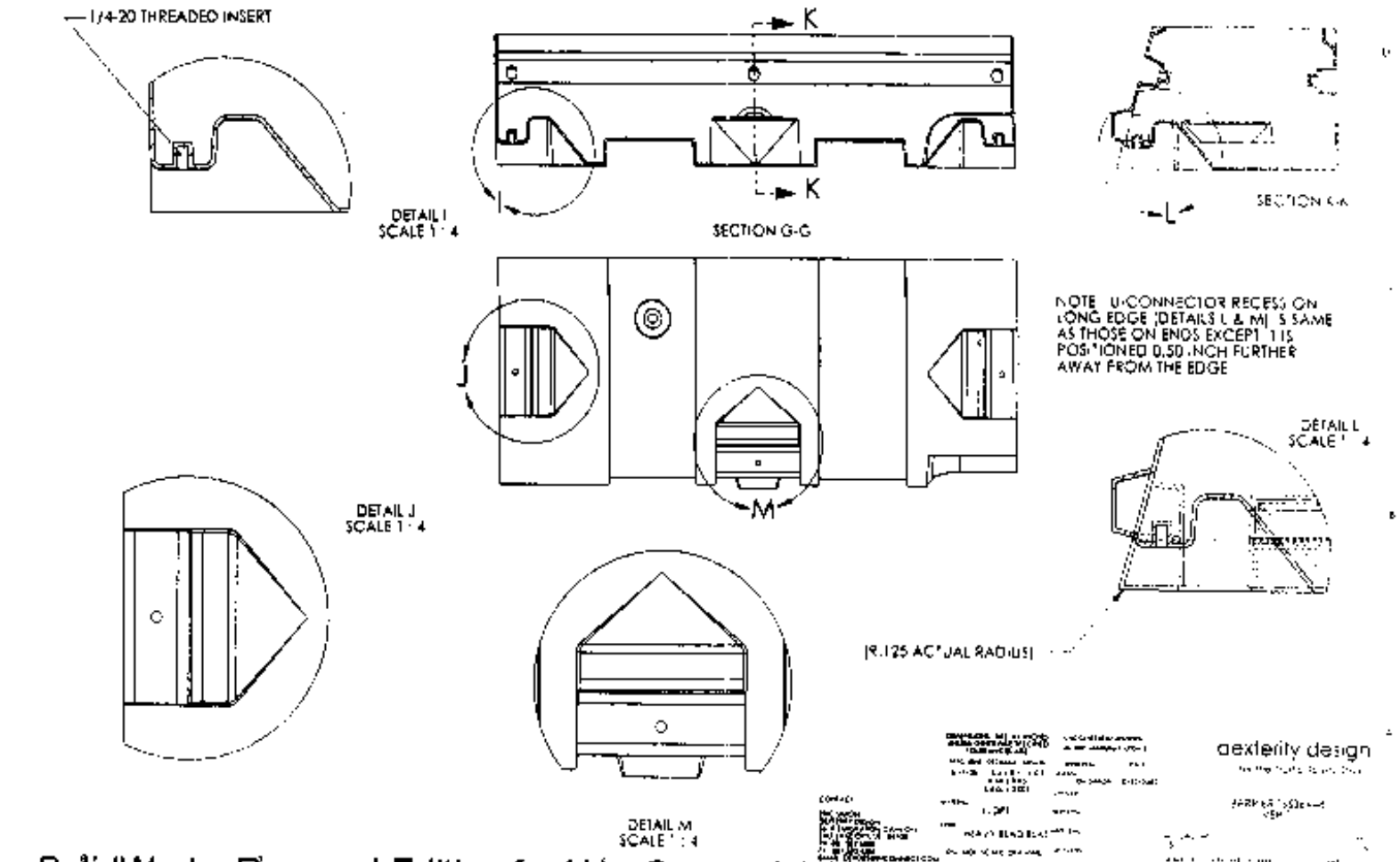

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