

Refer to: HSA-10/WZ-106

Mr. Leo J. Yodock, III  
Yodock Wall Co., Inc.  
3000 S.W. 4<sup>th</sup> Avenue  
Ft. Lauderdale, FL 33315

Dear Mr. Yodock:

Thank you for your letter of September 4, 2001, requesting Federal Highway Administration (FHWA) acceptance of your company's **Energy Dispersement Cell Channelizer (EDCC)** as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter was a report of crash testing conducted by the Texas Transportation Institute and videos of the tests. You requested that we find this device acceptable as a Test Level 2 (TL-2) device for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

On December 13, 2001, you met with members of the Office of Safety Design staff to discuss the crash-testing program, the results, and the proposed uses associated with these devices. On January 9, 2002, you submitted additional information as discussed at our meeting.

### **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 were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. 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.

A brief description follows:

### **Energy Dispersement Cell Channelizer - TL-2**

The Yodock Barrier Model 2001 EDCC units are rotomolded, low-density polyethylene, containers that can be partially filled with water as ballast. Overall dimensions on the units are 1830 mm long, 1170 mm tall, 610 mm width at the base, and 280 mm wide at the top. There are two forklift holes at 530 mm above ground level that nominally measure 150 mm x 280 mm.

The bottom vertical face of the device is 230 mm in height. Water ballast was placed in the units to the top of the vertical face located approximately 495 mm from the base of the device. The approximate measured volume of water in each unit was 170 L (45 U.S. Gallons.) A total of 40 units were placed adjacent to each other and coupled with Polyethylene couplers. Total length of the installation was 73.2 m (240 feet.) An internal flashing beacon and solar battery, weighing 4.0 kg, was installed on segments 13 and 14. Details of the EDCC units and couplers are shown in the enclosed drawings for reference.

This device was evaluated as a longitudinal channelizing barricade. This is a subcategory of barricades now being considered for inclusion in the Manual on Uniform Traffic Control Devices (MUTCD). They can be used singly as Type I, II or III barricades, or connected so they are highly visible and have good target value. The interlocking units of a longitudinal channelizing barricade can be used to delineate or channelize traffic flow including pedestrian traffic. The interlocking barricade does not have gaps through which pedestrians, bicyclists, or motor vehicles can filter. However, it is not designed to prevent penetration by vehicles under minimum crash test performance conditions. After discussions with my staff, it was determined that NCHRP Report 350 test 2-10 (820 kg passenger car impacting at 70 kmh at an angle of 20 degrees) would be appropriate; however, when evaluating its performance as a longitudinal channelizer barricade during this test, occupant risk and vehicle stability should be the determining criteria, and not structural adequacy. In other words, when the EDCC are used for channelizing, it would be acceptable for the vehicle to penetrate the longitudinal channelizer barricade in a safe manner.

### Testing

Full-scale automobile testing was conducted on your company's device. The test results are summarized in the following table.

Test Number	400001-YWC1
NCHRP Report 350 Test #	2-10
Test Article	Longitudinal Channelizer
Height to Bottom of Sign	n/a
Height to Top of Sign	n/a
Flags or lights	None
Test Article Mass (each)	60 kg + 200 kg water
Vehicle Inertial Mass	820 kg
Impact Speed	68.3 km/hr
Occupant Risk Values	
Occupant Impact Velocity	7.0 m/s
Ridedown x-direction	-4.9 g's

Ridedown y-direction	-4.3 g's
Max 0.050-s accel x-dir	-5.9 g's
Max 0.050-s accel y-dir	-3.6 g's
Max 0.050-s accel z-dir	-2.5 g's
Vehicle crush	100 mm
Occupant Compartment Intrusion	92 mm (crush)
Windshield Damage	none

In the test of the **EDCC** the vehicle penetrated the channelizer and yawed sharply. The side of the car then struck the exposed blunt end, causing minor deformation of the passenger compartment at the door. The resulting deformation has a low potential to cause serious injury to occupants of the impacting vehicle. The vehicle traveled 6.1 m behind the channelizer before coming to rest

### Findings

The **EDCC** does not meet the redirective requirements for a barrier. However, as a longitudinal channelizer it can provide an unbroken line of units that warn motorists from crossing into the protected area.

Because this device has been tested and met the unique requirements that have been set for them, the device described above and shown in the enclosed drawings for reference are acceptable for use on the NHS under the range of conditions tested and the additional conditions discussed above, when proposed by a State. In addition, the Model 2001m EDCC, which is 812 mm tall, will also be acceptable subject to the same conditions and restrictions as the crash-tested Model 2001 EDCC.

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 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 it will meet the crashworthiness requirements of FHWA and NCHRP Report 350.

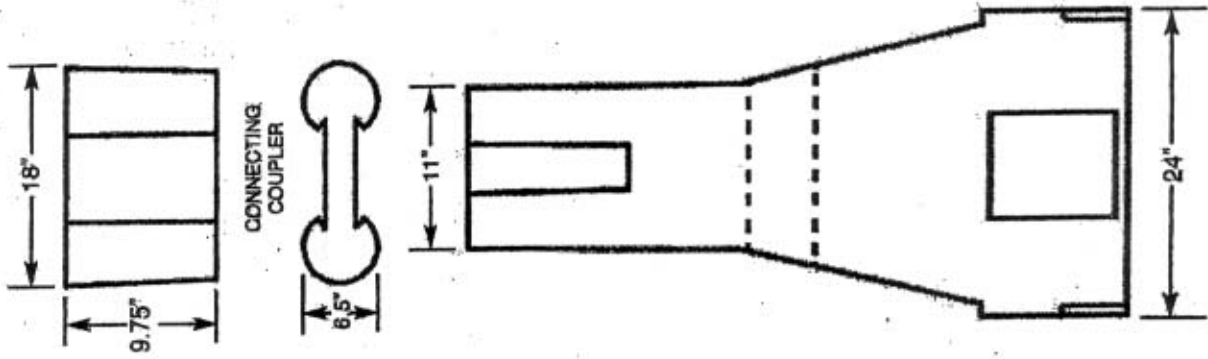
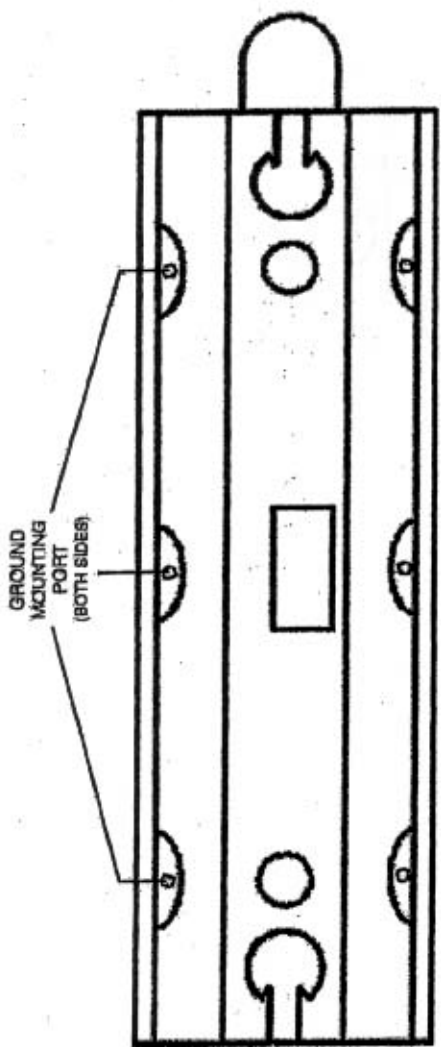
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-106 shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- The Yodock Wall plastic safety shape units are patented and 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 for use on Federal-aid projects, except exempt, non-NHS 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 types 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,

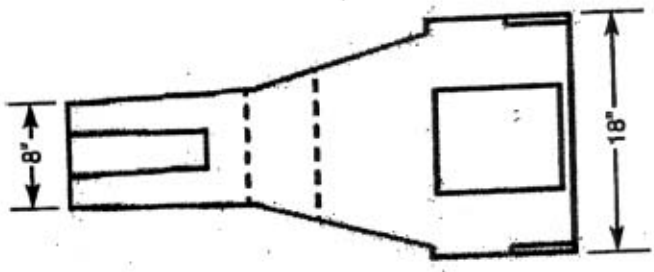
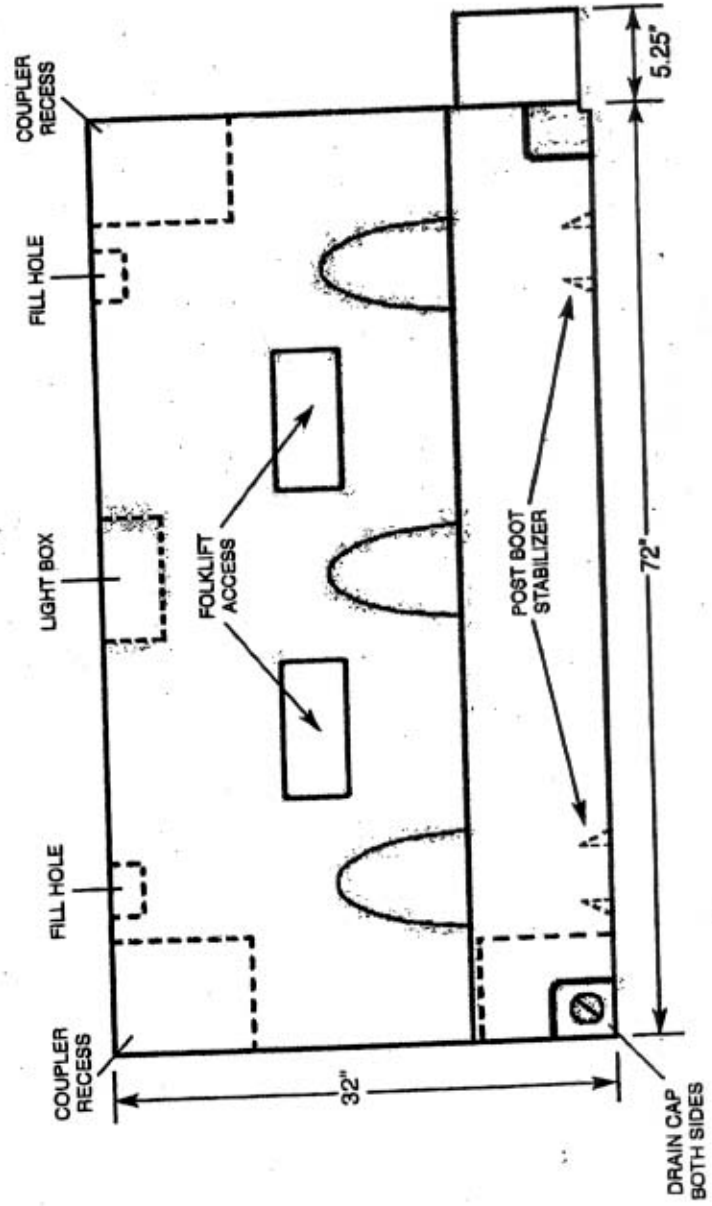
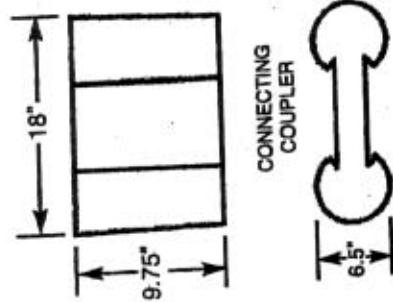
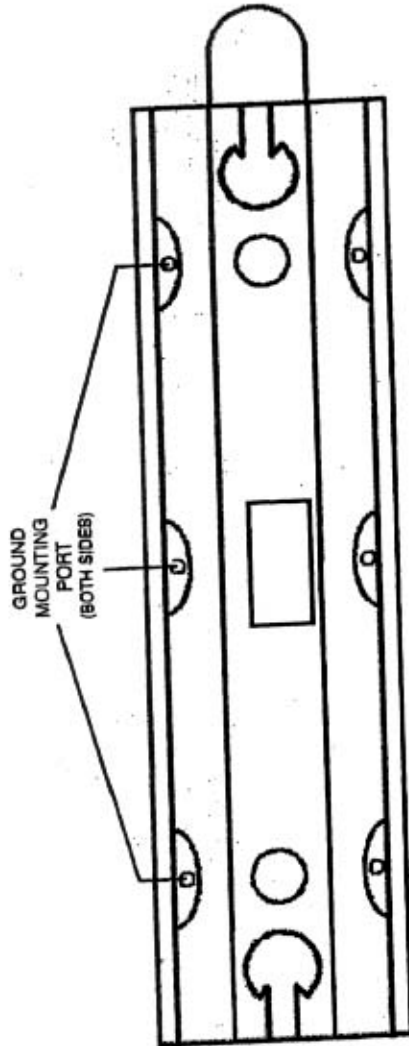
Michael L. Halladay  
Acting Program Manager, Safety

Enclosure

FHWA:HSA-10:NArtimovich:tb:x61331:2/06/02  
File: WZ106-Yodock.wpd  
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;  
N. Artimovich, HSA-10)



Yodock Barrier Model 2001 & connecting coupler PART A



Vadock Barrier Model 2001m (metrocoltlan) & connecting coupler | PART A

Drawings not to scale