



March 3, 2011

In Reply Refer To:  
HSSD/WZ-298

Mr. Mark Middleton  
Rochester Rotational Moldings  
1952 East Lucas Street  
Rochester, IN. 46975

Dear Mr. Middleton:

This letter is in response to your request for Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system: Rochester Rotational Molding Longitudinal Channelizer

Type of system: Longitudinal Channelizing Device

Test Level: AASHTO Manual for Assessing Safety Hardware  
Test Level 2

Testing conducted by: Texas Transportation Institute

Date of request: August 2, 2010

Date Final package: January 11, 2011

You requested that we find this system acceptable for use on the NHS under the provisions of the American Association of State Highway and Transportation Officials (AASHTO) "Manual for Assessing Safety Hardware" (MASH).

### **Requirements**

Roadside safety devices should meet the guidelines contained in the MASH.

### **Decision**

The following device was found acceptable, with details provided below:

- Test Level 2 (TL-2) Water Filled Channelizer

### **Description**

The test installation is the Rochester Rotational Moldings Longitudinal Channelizer (LC). This is a low density polyethylene, rotationally molded, water holding container. This LC is 72 inches long and 24 inches wide at the base and 10 inches wide at the top. The total height of the LC is 42 inches.



There is a 6 inch wide rounded slot on one end of the LC that extends full height of the LC and a 5-3/4 inch wide rounded protrusion on the opposite end that extends full height of the LC. There is a lower vertical face on the LC, 6 inches tall. Installation consisted of 20 sections for a total length of 120 feet. Water was placed in each of the LC to the top of the lower vertical face. The empty weight of each LC was 105 pounds and the tested total weight of each LC was 461 pounds. The LC's were installed with the protrusions pointed to the downstream end of the installation.

Details are provided as enclosure to this correspondence.

### **Crash Testing**

Physical crash test for TL-2 as per MASH requires that longitudinal barrier systems be subjected to the following two full-scale vehicle crash tests:

1. Test Designation 3-90: A 1100C vehicle (2,425-lb) passenger car impacting at a nominal speed and angle of 100.0 km/h (62 mph) and Critical Impact Angle (CIA) of 0-25 degrees respectively.
2. Test Designation 3-91: A 2270P vehicle (5,004-lb) pickup truck impacting at a nominal speed and angle of 100.0 km/h (62 mph) and CIA of 0-25 degrees respectively.

Only test designation 3-90 was conducted for the LC described within the description section of this correspondence. As per Texas Transportation Institute e-mail correspondence dated January 11, 2011, regarding test designation 3-91, no testing of the 2270P vehicle was conducted as part of the MASH testing of the Water Filled Channelizer due to vehicle higher impact energy and stability. In addition, the CIA used for testing was reviewed and accepted by Mr. Nicholas Artimovich, Highway Engineer, FHWA Office of Safety.

### **Findings**

The LC allowed controlled penetration of the system by the 1100C vehicle. Units 8 thru 10 broke apart but did not penetrate nor show potential for penetrating the occupant compartment. The 2 largest pieces weighing 60 pounds and 45 pounds slid along the surface of the concrete pavement at a fairly low rate of speed with the heaviest piece subsequently coming to rest 60 feet downstream and 15 feet toward the field side. No occupant compartment deformation or intrusion occurred. The 1100C vehicle remained upright during and after the collision event. Occupant risk factors were within the limits specified in MASH. The 1100C vehicle came to rest on the field side (behind) the installation. A physical crash test summary is included as enclosure to this correspondence.

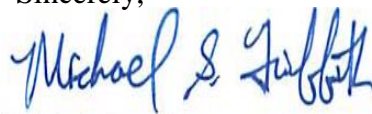
Therefore, test designation 3-90, as conducted on the Rochester Rotational Molding LC was determined to be acceptable according to the TL-2 safety performance criteria found in MASH. In addition, the requested waiver of test designation 3-91 and reasoning as provided within this correspondence is also accepted.

In addition, the system described in the requests above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

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

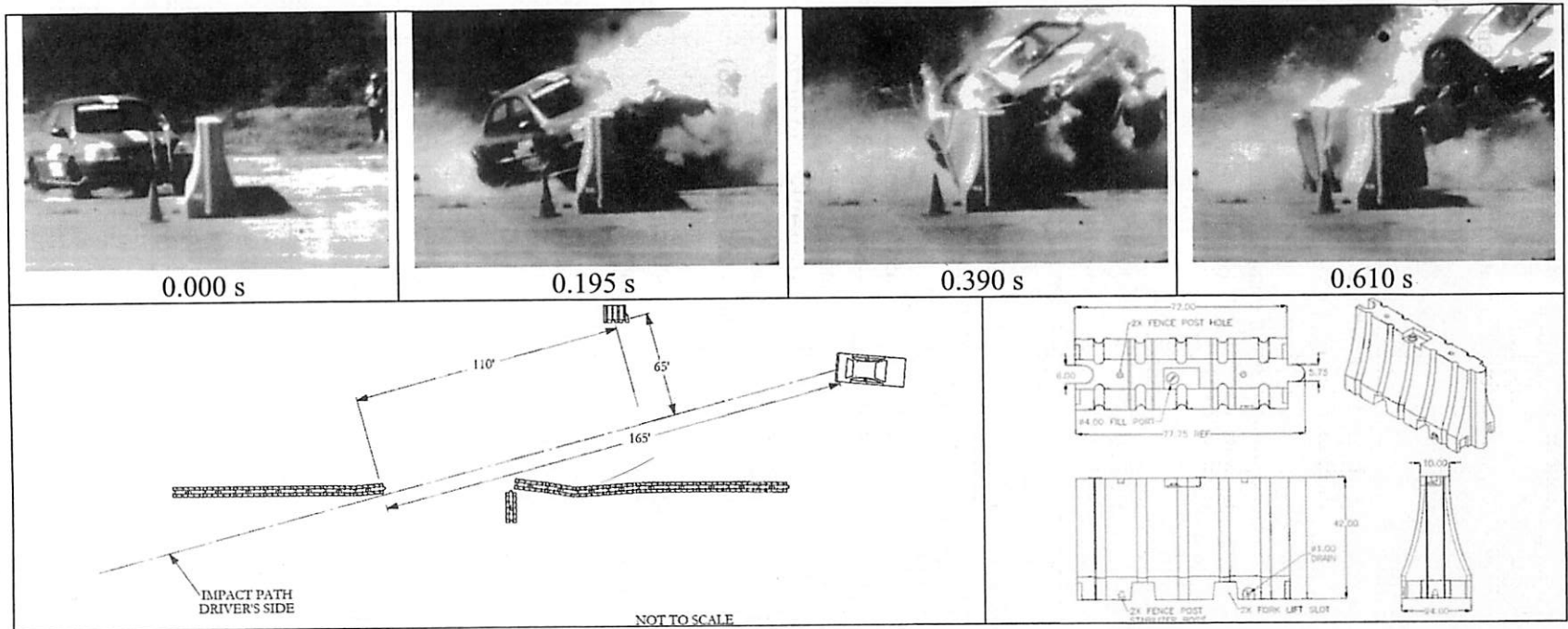
- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance 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 the AASHTO MASH.
- To prevent misunderstanding by others, this letter of acceptance is designated as number WZ-298 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.
- 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.
- Because some water ballasted barriers and channelizers are similar in appearance, the FHWA recommends labeling each unit or module to indicate limitations on use. When used as a barrier, all hardware, both internal and external that was used in the crash testing, shall be installed per the manufacturer's instructions. Recommended guidance for such labels may be found on the web site of the AASHTO/AGC/ARTBA Task Force 13 at <http://www.aashtotf13.org>.
- The Rochester Rotational Molding Longitudinal Channelizers are patented products and considered proprietary. If proprietary systems 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.

Sincerely,



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

Enclosures



**General Information**

Test Agency..... Texas Transportation Institute  
 Testing Standard Test No..... MASH 3-90  
 Test No. .... 400001RRM1  
 Date ..... 2010-04-13

**Test Article**

Type..... Longitudinal Channelizer  
 Name ..... Rochester Rotational Molding  
 Installation Length ..... 120.0 ft  
 Material or Key Elements ..... Low density polyethylene, rotationally molded, water holding container 42 inches tall and 72 inches long, ballasted to 461 lb

Soil Type and Condition..... Concrete Surface, Dry

**Test Vehicle**

Type/Designation..... 1100C  
 Make and Model ..... 2003 Kia Rio  
 Curb ..... 2411 lb  
 Test Inertial ..... 2391 lb  
 Dummy ..... 170 lb  
 Gross Static ..... 2561 lb

**Impact Conditions**

Speed .....62.3 mi/h  
 Angle .....14.4 degrees  
 Location/Orientation .....At joint 7-8

**Exit Conditions**

Speed .....Not obtainable  
 Angle .....27.0 degrees

**Occupant Risk Values**

Impact Velocity  
 Longitudinal.....22.6 ft/s  
 Lateral .....3.3 ft/s  
 Ridedown Accelerations  
 Longitudinal.....-5.2 G  
 Lateral .....-4.6 G  
 THIV .....24.6 km/h  
 PHD .....6.0 G  
 AST .....0.49  
 Max. 0.050-s Average  
 Longitudinal.....-5.8 G  
 Lateral .....-2.9 G  
 Vertical .....-4.1 G

**Post-Impact Trajectory**

Stopping Distance .....165 ft dnwnstr  
 15 ft twd field side

**Vehicle Stability**

Maximum Yaw Angle.....30degrees  
 Maximum Pitch Angle.....13 degrees  
 Maximum Roll Angle.....51 degrees  
 Vehicle Snagging.....No  
 Vehicle Pocketing .....No

**Test Article Deflections**

Dynamic.....Penetrated  
 Permanent.....Penetrated  
 Working Width .....165 ft

**Vehicle Damage**

VDS .....11LFQ1  
 CDC.....11FLEW1  
 Max. Exterior Deformation.....2 inches  
 Max. Occupant Compartment Deformation.....0

Figure 5.7. Summary of results for MASH test 3-90 on Rochester Rotational Molding longitudinal channelizer.

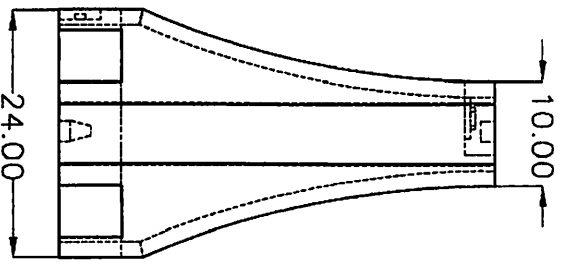
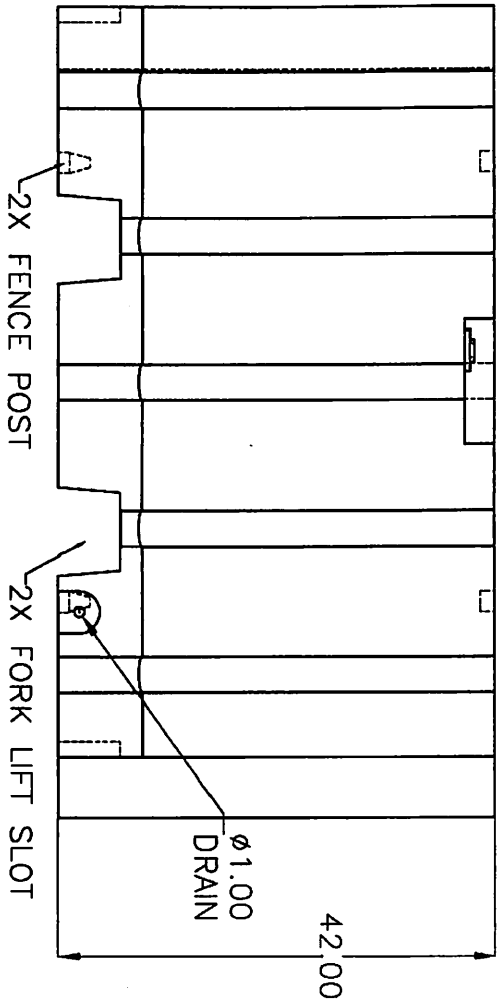
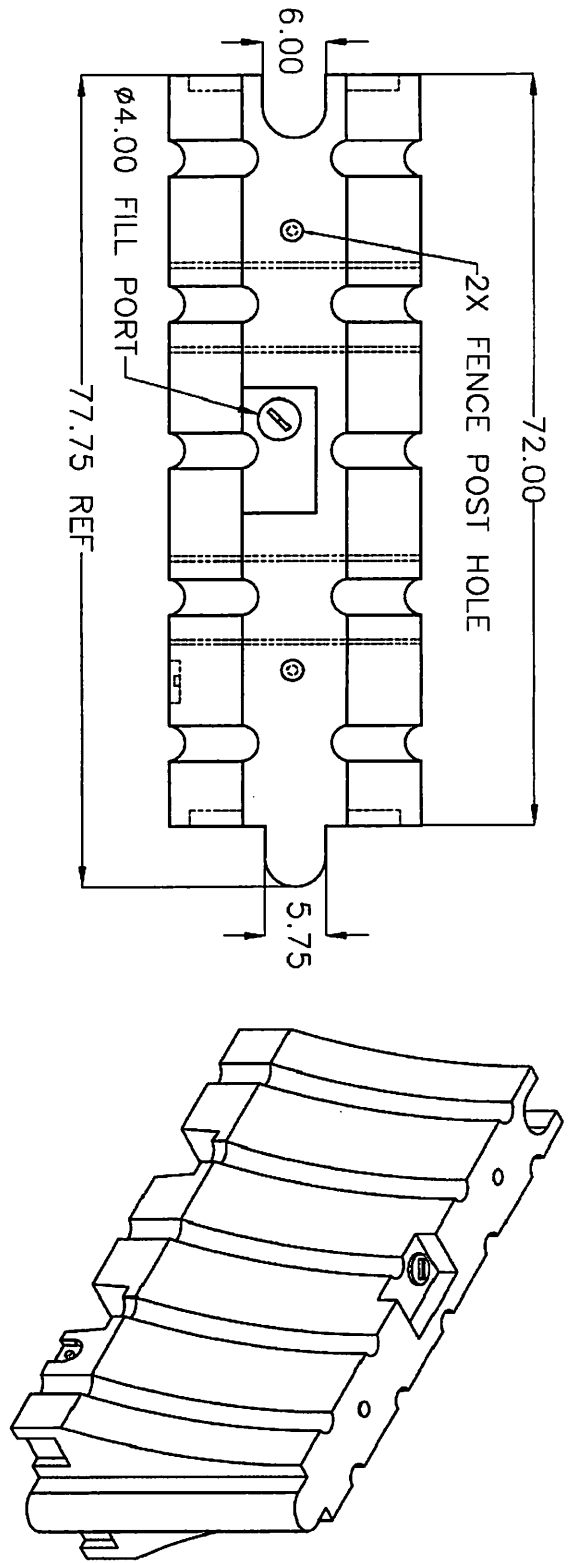
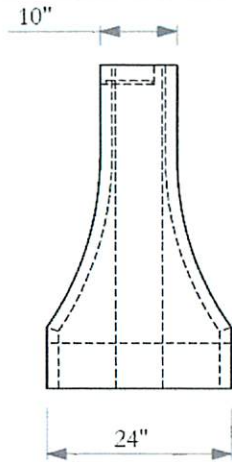
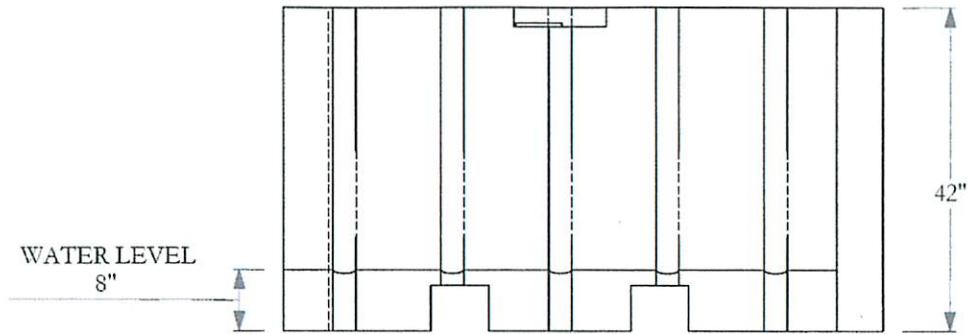


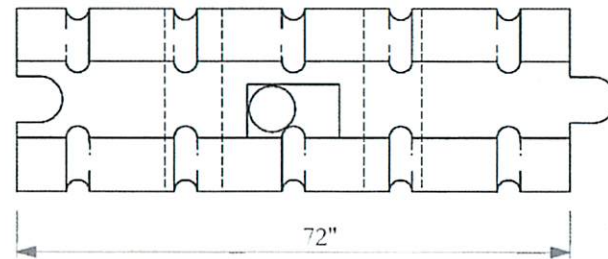
Figure 2.1. Details of the Rochester Rotational Molding longitudinal channelizer.



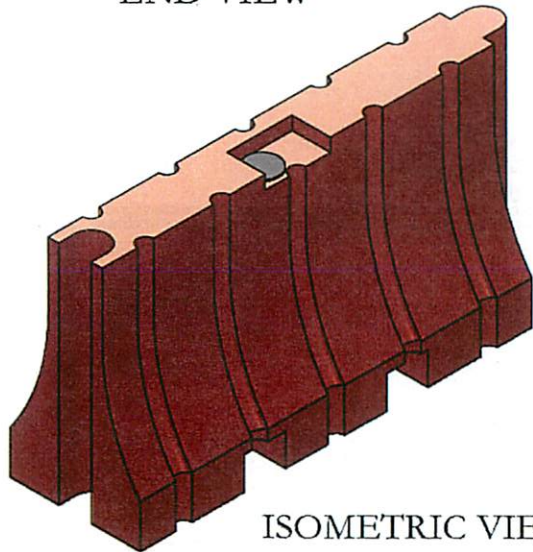
END VIEW



ELEVATION VIEW



PLAN VIEW



ISOMETRIC VIEW

3. Radius on barrier edges not shown for clarity.

| The Texas A&M University System                                |      |    |     |                          |          |       |           |
|--|------|----|-----|--------------------------|----------|-------|-----------|
| Texas Transportation Institute<br>College Station, Texas 77843 |      |    |     |                          |          |       |           |
| Revisions:   |      |    |     | Date                     | Drawn By | Scale | Sheet No. |
| No.  | Date | By | Chk |                          |          |       |           |
| 1.   |      |    |     |                          |          |       |           |
| 2.   |      |    |     | 2010-04-02               | GES      | 1:20  | 2 of 2    |
| 3.   |      |    |     | Project No.              | Barriers |       |           |
| 4.   |      |    |     | 400001-RRM1              |          |       |           |
| 5.   |      |    |     | Rochester Water Barriers |          |       |           |