April 24, 1997

Mr. J. M. Essex
Vice President, Sales
Energy Absorption Systems, Inc.
One East Wacker Drive
Chicago, Illinois 60601

Dear Mr. Essex:

In your February 21 letter to Mr. Gerald L. Eller, you requested the Federal Highway Administration’s (FHWA) acceptance of a truck-mounted attenuator (TMA) called the Alpha 100K TMA as an NCHRP Report 350 test level 3 (TL-3) TMA. Included with your letter were copies of a report from E-TECH Testing Services, Inc., dated February 1997 and entitled "NCHRP Report 350 Crash Test Results for the ALPHA 100K TMA” and videotapes of the compliance tests that were run. On March 3 you sent us additional information which we had requested, including detailed drawings of the tested design.

The ALPHA 100K TMA is attached to under-ride brackets connected to the frame of a support vehicle, details of which were provided to us with your April 22 correspondence and have been retained for our files. The Alpha 100K TMA incorporates an ALPHA 350DX cartridge containing energy absorbing cells made from lightweight aluminum sheet metal of various thicknesses. This cartridge has a molded plastic “Durashell” nose attached to it which is designed to minimize damage to the main cartridge in low speed impacts. In addition, there are an auxiliary (350 AUX-1) energy absorbing cartridge and four 350 AUX-2 cartridges (two on each side of the 350 AUX-1 cartridge) in a collapsible support frame located between the support vehicle and the 350DX cartridge. This design and its dimensions are shown on the enclosed drawings (drawing number 75-02-53B, sheet 3 of 6). Total weight of the TMA was reported as approximately 750 kg.

Three NCHRP Report 350 compliance tests were reported: Test 2-50, Test 3-50 and Test 3-51. The support vehicle for both tests was a 8,550-kg dump truck. In tests 3-50 and 3-51, the truck
was in second gear with its brakes locked. It rolled ahead 1.5 meters in test 3-50 and 4.0 meters in test 3-51.

Current FHWA policy permits use of an unblocked truck for test 3-50 if a TMA has satisfactorily met the NCHRP Report 350 evaluation criteria at TL-2 (Test 2-50) with the support vehicle blocked. For test 2-50 (contained in a January 1996 E-TECH Report entitled “ALPHA 70K TMA Crash Test Report”), the truck was blocked to prevent movement. Although the ALPHA 100K used for test 3-50 differed from that used for test 2-50, we concur that the changes were such that the earlier results can be considered applicable to the new design. Specifically, the addition of the collapsible frame and auxiliary cartridges soften the system, as well as adding stroke distance to the unit. The results of these tests are summarized in Enclosure 2. We have noted that the occupant impact velocity in Test 3-50 was 12.1 m/s. However, the FHWA has previously accepted a maximum limit of 12.2 m/s and considers this result to be acceptable.

Based on our review of the information you submitted, we consider the ALPHA 100K TMA as shown on the enclosed drawings to be acceptable for use on the National Highway System (NHS) as a TL-3 device when such use is requested by a highway agency. As a proprietary product, its use on Federal-aid highway projects, except exempt, non-NHS projects, is subject to the conditions stated in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is Enclosure 3.

Sincerely yours,

(original signed by Seppo I. Sillan)

for Dwight A. Horne, Chief
Federal-Aid and Design Division

3 Enclosures
Acceptance Letter CC-39
Figure 1. Summary of Results - ALPHA 70K TMA Test 183-005
General Information
Test Agency: E-TECH Testing Services, Inc.
Test Designation: NCHRP 350 Test 3-59
Test No.: 01-7617-003
2/13/97

Test Article
Type: Energy Absorption Systems, Inc.
Installation Length (cm): 472 (overall system)
Size and/or dimension and material of key elements (cm):
- 254 ALPHA 350DX Cartridge
- 167 ALPHA 350-AUX1 Cartridge
- 44 ALPHA 350-AUX2 Cartridge

Test Vehicle
Type: Production Model
Model: 1988 Ford Festiva Hatchback

Mass (kg):
- Curb: 773
- Test inertial: 844
- Dummy(s): 75
- Gross Static: 919

Impact Conditions
- Speed (km/h): 96.97
- Angle (deg): 0.0
- Impact Severity (kJ): 306.18

Exit conditions
- Speed (km/h): N/A
- Angle (deg): N/A

Occupant Risk Values
- Impact Velocity (m/s):
  - x-direction: 12.11
  - y-direction: 0.02
- Ridedown Acceleration (g's):
  - x-direction: -17.97
  - y-direction: 2.83
- THIV (m/s^2): 12.13
- PHD (g's): 16.97
- ASI: 1.40
- Support Vehicle Acceleration (max. 10ms g's): N/A

Test Article Deflections (m)
- Dynamic: 3.3
- Permanent: N/A

Vehicle Damage
- Exterior: VDS: FD-3
- CDC: 12FDEW3
- Interior: OCCL: AS0000000
- Post-Impact Vehicular Behavior (deg - gyro @ c.g.):
  - Maximum Roll Angle: -0.99
  - Maximum Pitch Angle: 1.49
  - Maximum Yaw Angle: 1.18

Summary of Results - ALPHA 100K TMA Test 01-7617-003
### General Information

**Test Agency** | E-TECH Testing Services, Inc.  
**Test Designation** | NCHRP 350 Test 3-51  
**Test No.** | 01-7617-002  
**Date** | 2/10/97  

**Test Article**

**Type** | Production Model  
**Model** | 2000P  
1992 Chevrolet C2500  
3/4 Ton Pickup  

**Mass (kg)**

- Curb: 1982  
- Test inertial: 1999  
- Dummy(b): 1999  
- Gross Static: 1999

**Impact Conditions**

- Speed (km/h): 96.63  
- Angle (deg): 0  
- Impact Severity (kJ): 728.03

### Exit Conditions

- Speed (km/h): N/A  
- Angle (deg): N/A  
- Occupant Risk Values  
  - Impact Velocity (m/s)
    - x-direction: 10.28  
    - y-direction: 0.28  
  - Ridedown Acceleration (g's)
    - x-direction: -17.18  
    - y-direction: 11.37  
  - THIV (ms): 10.39  
  - PHID (g's): 16.77  
  - ASI: 1.41  
- Support Vehicle Acceleration (max. 10ms g's): 4.93

### Test Article Deflections (mm)

- Dynamic: 3.6  
- Permanent: 3.5

### Vehicle Damage

**Exterior**

- VDS: FD-4  
- CDC: 12FCEW3

**Interior**

- OCDI: AS0000000  
- Post-Impact Vehicular Behavior (deg - gyro @ c.g.)
  - Maximum Roll Angle: 7.42  
  - Maximum Pitch Angle: 3.69  
  - Maximum Yaw Angle: 5.27

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**Figure 6. Summary of Results - ALPHA 100K TMA Test 01-7617-002**
processes including application of a coating, for use materials must occur in the United States. Coating includes all processes which protect or enhance the value of the material to which the coating is applied.

(2) The State has standard contract provisions that require the use of domestic materials and products, including steel and iron materials, to the same or greater extent as the provisions set forth in this section.

(3) The State elects to include alternate bids for foreign and domestic steel and iron materials which comply with the following requirements. Any procedure for obtaining alternate bids based on furnishing foreign steel and iron materials which is acceptable to the Division Administrator may be used. The contract provisions must (1) require all bidders to submit a bid based on furnishing domestic steel and iron materials, and (2) clearly state that the contract will be awarded to the bidder who submits the lowest total bid based on furnishing domestic steel and iron materials unless such total bid exceeds the lowest total bid based on furnishing foreign steel and iron materials by more than 25 percent.

(4) When steel and iron materials are used in a project, the requirements of this section do not prevent the use of foreign steel and iron materials, if the cost of such materials used does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or $2,500, whichever is greater. For purposes of this paragraph, the cost is that shown to be the value of the steel and iron products as they are delivered to the project.

(c)(1) A State may request a waiver of the provisions of this section if:

(c)(2) The application of those provisions would be inconsistent with the public interest; or

(1) Steel and iron materials/products are not produced in the United States in sufficient and reasonably available quantities which are of satisfactory quality.

(2) A request for waiver, accompanied by supporting information, must be submitted in writing to the Federal Highway Administrator (FHWA) through the FHWA Division Administrator. A request must be submitted sufficiently in advance of the need for the waiver in order to allow time for proper review and action on the request. The FHWA will have approval authority on the request.

(3) Requests for waivers may be made for specific projects, or for certain materials or products in specific geographic areas, or for combinations of both, depending on the circumstances.

(4) The denial of the request by the FHWA may be appealed by the State to the Federal Highway Administrator (Administrator), whose action on the request shall be considered administratively final.

(5) A request for a waiver which involves nationwide public interest or availability issues or more than one FHWA region may be submitted by the FHWA to the Administrator for action.

(6) A request for waiver and an appeal from a denial of a request must include facts and justification to support the granting of the waiver. The FHWA response to a request or appeal will be in writing and made available to the public upon request. Any request for a nationwide waiver and FHWA's action on such a request may be published in the Federal Register for public comment.

(7) Determining whether the waivers described in paragraph (c)(1) of this section will be granted, the FHWA will consider all appropriate factors including, but not limited to, cost, administrative burden, and delay that would be imposed if the provision were not waived.

(d) Standard and Federal-aid contract provisions may be used to assure compliance with the requirements of this section.

§ 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 public works; and (2) the number and types of such materials which shall be forth in the specifications for various types of contract installations.

(a) Reference in specifications and plans to single trade name material will not be approved on Federal contracts.

§ 635.413 Warranty clauses.

(a) By virtue of their presence in their National Highway System (NHS) construction contracts in accordance with the following:

(b) A SHA may include warranty provisions in its NHS construction contracts in accordance with the following:

(1) (a) Warranty provisions shall be in specific construction product or service. Items of maintenance not eligible for Federal participation shall not be covered.

(2) Any warranty requirements shall be subject to the Division Administrator advance approval.

(3) The Division Administrator, in the judgment of the Division Administrator, may place undue obligation on the contract items over which the contractor has control.

(c) A SHA may follow its own procedures regarding the inclusion of warranty provisions in non-NHS Federal contracts.

§ 635.417 Convicted material producer.

(a) Materials produced after July 1, 1961, by convict labor may only be incorporated in a Federal-aid highway construction project if such materials have been approved by a qualified prison facility.

(b) Convicted prison facilities may receive and process materials for Federal-aid highway construction projects if such materials have been approved by the Bureau of Prisons.