



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

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

APR 14 1983

Refer to: HNG-14

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

Dear Mr. Essex:

On March 31 you met with representatives of my office and other Federal Highway Administration (FHWA) offices to present information on your BarrierGate system and to request FHWA acceptance of this device for use on Federal-aid highway projects.

The BarrierGate is a longitudinal barrier used in conjunction with a concrete safety shape to provide a temporary opening in the continuous barrier for use by emergency vehicles or re-routed traffic. The BarrierGate consists of two half gates made with three-beam rail elements. These half gates slide along a track system and are opened by an electrical winch. A manual override system can be used in the event a power failure occurs. Separate fixed concrete safety shape end sections, and intermediate, shorter CMB sections complete the system. The enclosure details each of these elements.

The BarrierGate was evaluated at test level 3 of the National Cooperative Highway Research Program (NCHRP) Report No. 350, "Recommended Procedures for the Safety Evaluation of Highway Features." Although this document has not been published yet, portions of it have appeared in the Federal Register under an Notice of Proposed Rulemaking and it is unlikely that the test matrix for test level 3 will change. The tests run and their results were as follows:

<u>Test Number</u> <u>(NCHRP 350 No.)</u>	<u>150-006</u> <u>(3-11)</u>	<u>150-007</u> <u>(3-21)</u>	<u>150-008</u> <u>(3-10)</u>
Vehicle, Mass, (kg)	1987	2034	913
Impact Speed, km/h	93.2	99.0	100.0
Angle, Degrees	26	26	19

Occupant Risk Values:

Impact Velocity, m/s

Longitudinal	5.56	4.38	6.14
Lateral	5.10	4.06	9.03

Ridedown Acceleration (G's)

Longitudinal	-8.88	-7.77	-5.29
Lateral	8.99	9.00	7.61

Permanent Deflection, m	0.53	0.69	0.00
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Based on these results, we agree that the BarrierGate has met the requirements for a test level 3 barrier in accordance with the NCHRP Report No. 350 and is acceptable for use on Federal-aid projects when requested by a State highway agency. This acceptance is based solely on crash-test performance and does not imply review or acceptance of the electrical-mechanical aspects of the design.

While reviewing the draft test report we noted some areas in need of clarification or correction. Specifically, Table 4 on page 29 indicates that the test vehicles stopped "in contact with the barrier." Clearly this was not so; each of the test vehicles was stopped after leaving the BarrierGate by impacting Triton units. Due to the placement of the latter, it is not certain how far into adjacent lanes any of the test vehicles would have traveled.

The impact severity (IS) of test 150-006 was very near the lower limit in the NCHRP Report 350 for test 3-11 and the impact speed was less than the minimum value of 96 km/h suggested in Table 3.5 of the report. The NCHRP Report 350 further recommends that the IS for a longitudinal barrier equal or exceed the target value. However, since the vehicles in tests 3-11 (strength) and 3-21 (transition) both struck near the center of the barrier and the test criteria were met fully in the second test with the barrier showing significant reserve strength, we will accept the overall results. A discussion of how the critical impact point (CIP) for the transition test was selected would be useful as there is some question whether or not a point closer to the intermediate CMB section is more critical than the selected impact location.

We noted in both 25 degree tests that the dynamic deflection of the barrier was approximately one meter. It is also apparent that the BarrierGate has a lower ultimate performance limit than the concrete safety shape in which it is used. These may be a factors to consider at locations where high-speed, high-angle impacts are likely and where commercial trucks constitute a significant percentage of the traffic stream.

Before we formally notify our field offices of the BarrierGate's acceptability, we would like your response to the above observations and a final copy of the crash test report. We have received the full set of

drawings you agreed at the March 31 meeting to send; a reduced scale drawing suitable for reproduction and distribution to our field offices would now be useful.

Sincerely yours,

A handwritten signature in cursive script that reads "L. A. Staron".

Lawrence A. Staron
Chief, Federal-Aid and Design Division

Enclosure

