September 12, 2003

Refer to: HSA-10/B-117

Ronald K. Faller, Ph.D., P.E.
Research Assistant Professor
University of Nebraska – Lincoln
1901 Y Street, Bldg. C
Lincoln, NE 68588-0601

Dear Mr. Faller:

In your August 25 letter to Mr. A. George Ostensen, you requested the Federal Highway Administration's (FHWA) formal acceptance of three **non-proprietary** longitudinal barrier systems for use on the National Highway System (NHS). The first system will be addressed in this letter, and the remaining two designs will be covered in subsequent correspondence. The first design consisted of stacked steel H-Sections connected end-to-end and bolted to a simulated bridge deck. It was developed specifically for use at locations where typical lateral deflections for temporary concrete barrier were unacceptable.

The tested design was a modification of a temporary barrier developed and used by the Iowa Department of Transportation. The original design consisted of two ASTM A36 steel HP 356 mm x 109 mm x 6.1-m long beams, stacked one above the other with the box section formed by the stacked HP shapes filled with concrete. The stacked barrier is approximately 29 inches (741 mm) high and its width is approximately 13.5 inches (346 mm). The tested design used four steel angle brackets welded to the traffic side of the barrier through which the barrier was fastened to the simulated bridge deck with four 19-mm diameter x 57-mm long ASTM A307 bolts placed into drop-in concrete anchors. Four angle brackets may also be attached to the field side of the barrier so it can be installed along the opposite side of the bridge without having to be rotated 180 degrees, but only the traffic side of the barrier is bolted to the bridge deck. Whereas the original design used welded splice plates to connect the upper and lower HP sections and to join adjacent segments, the final design used a continuous weld to connect the upper and lower beams and shear plates with drop pins to connect adjacent segments of barrier. Specific dimensions and other design details are shown in Enclosure 1.

The National Cooperative Highway Research Program (NCHRP) Report 350 test 3-11 was successfully conducted on the final design and is described in the Midwest Roadside Safety Facility's May 30, report entitled, Development of a Steel H-Section Temporary Barrier for use in Limited Deflection Applications." Enclosure 2 is a summary sheet of the test results.

I agree with your conclusion that the H-Section barrier met all NCHRP Report 350 evaluation criteria for a test level 3 barrier and conclude that it can be used as such on the NHS when its use is acceptable to the contracting agency. Although the reported dynamic deflection of the

barrier was 314 mm when installed 330 mm from the edge of the simulated deck, you concluded that the barrier could safely be installed within 150 mm from the edge without danger that the barrier would separate or be dislodged from the deck. I concur with this assessment, but suggest that all field installations be monitored to verify acceptable performance under these conditions.

Sincerely yours,

(original signed by John R. Baxter)
John R. Baxter, P.E.
Director, Office of Safety Design
Office of Safety

2 Enclosures

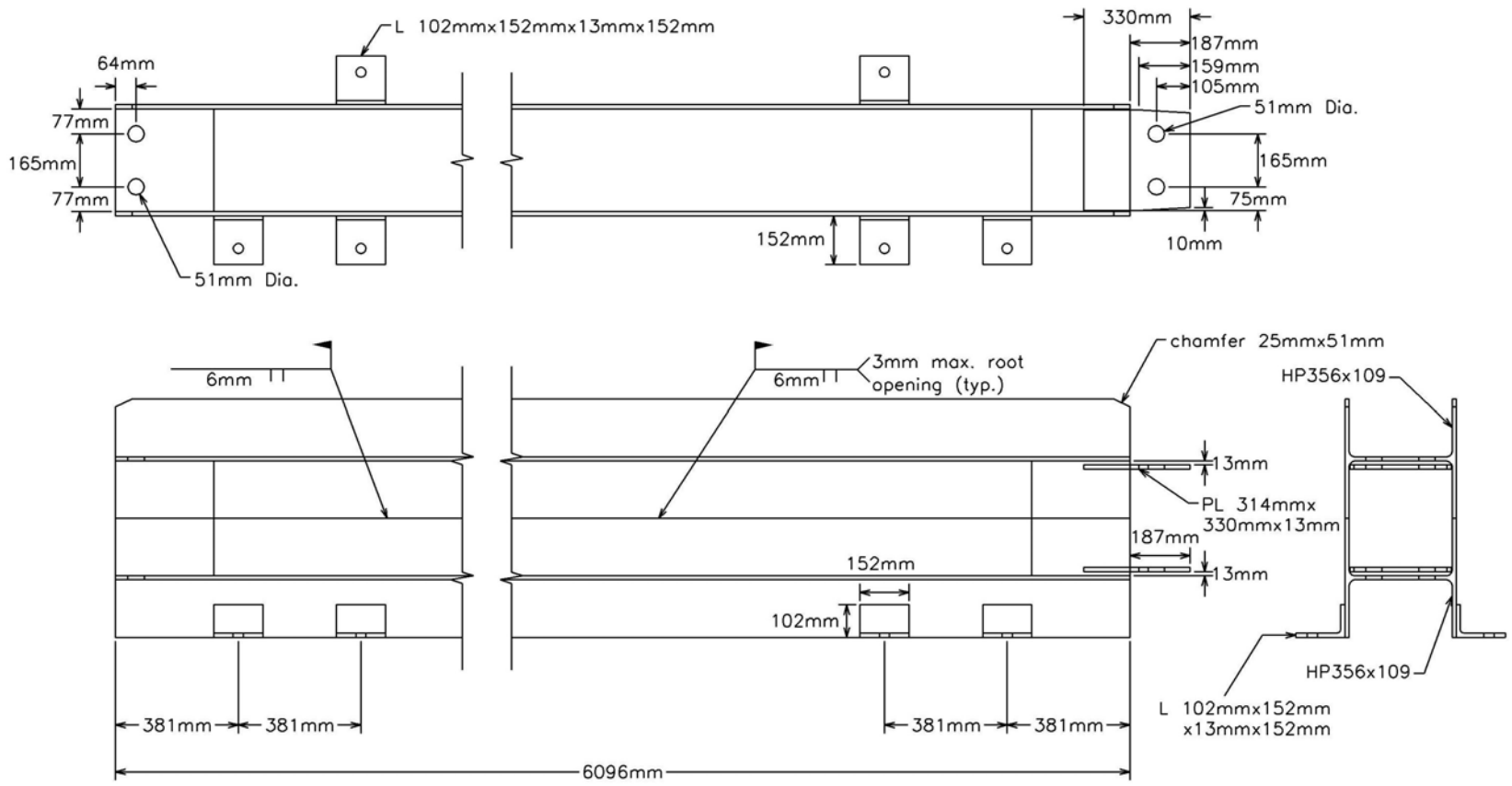


Figure 33. Steel H-section Temporary Barrier Design Details (Design No. 2)

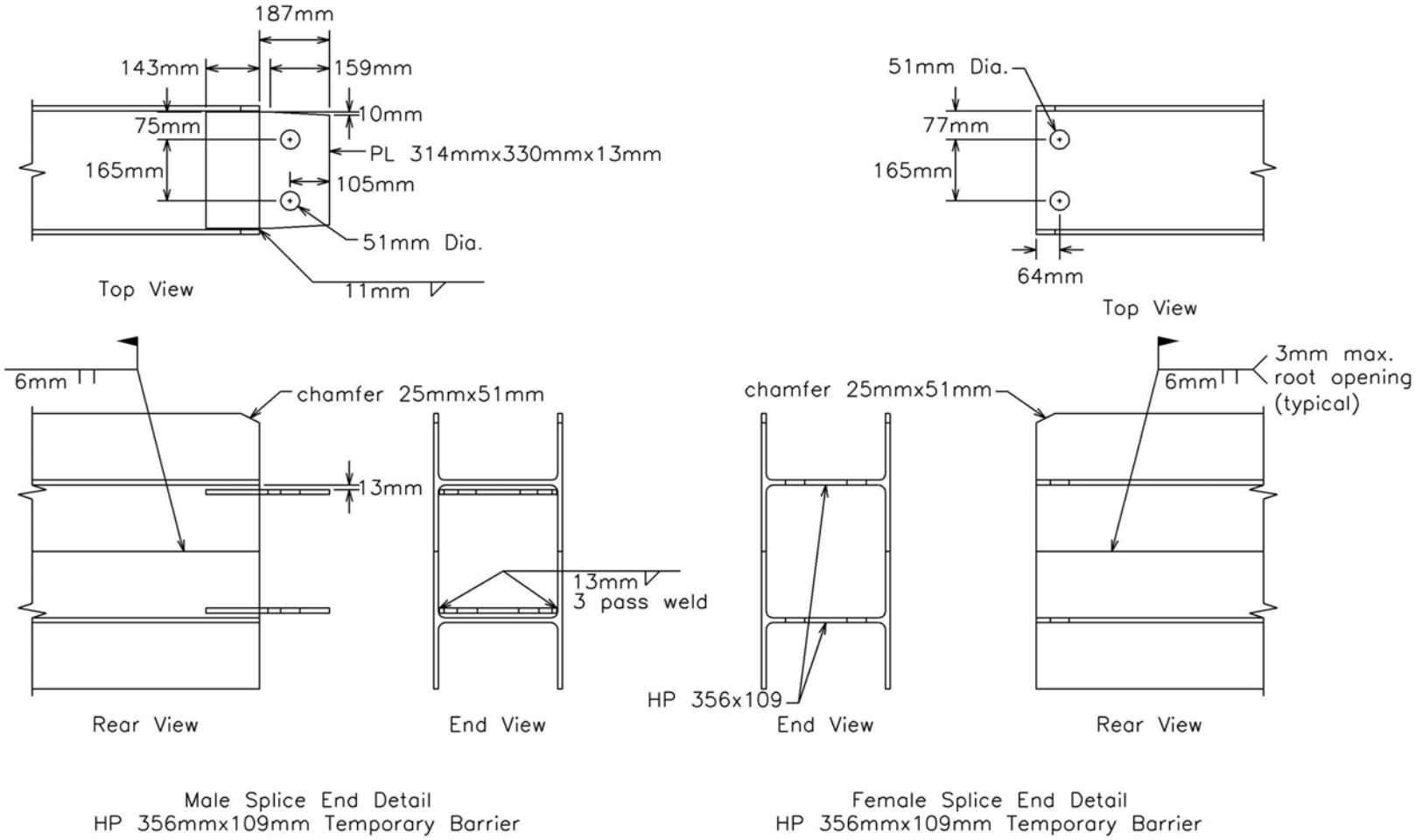


Figure 34. Steel H-section Temporary Barrier End Details (Design No. 2)

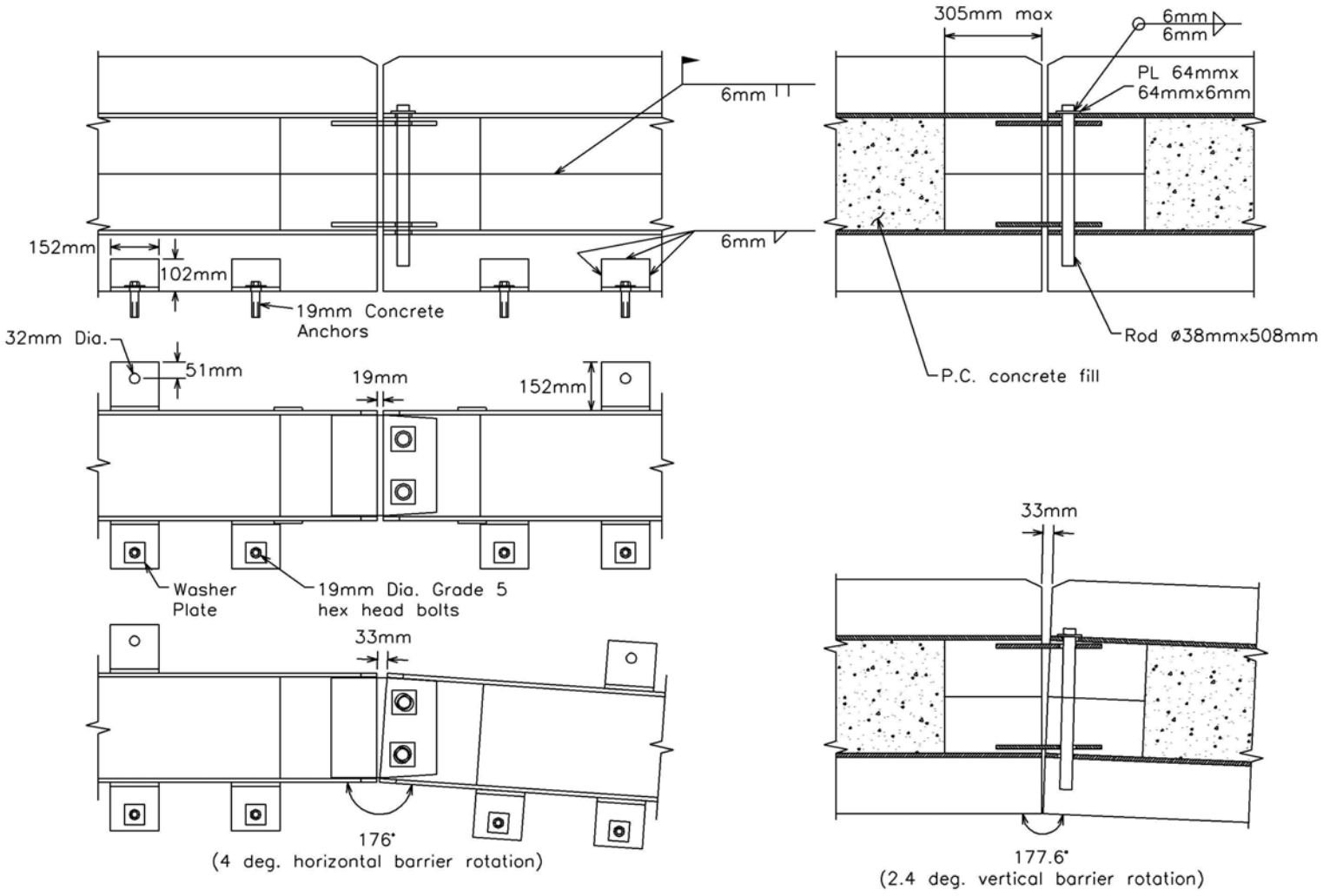
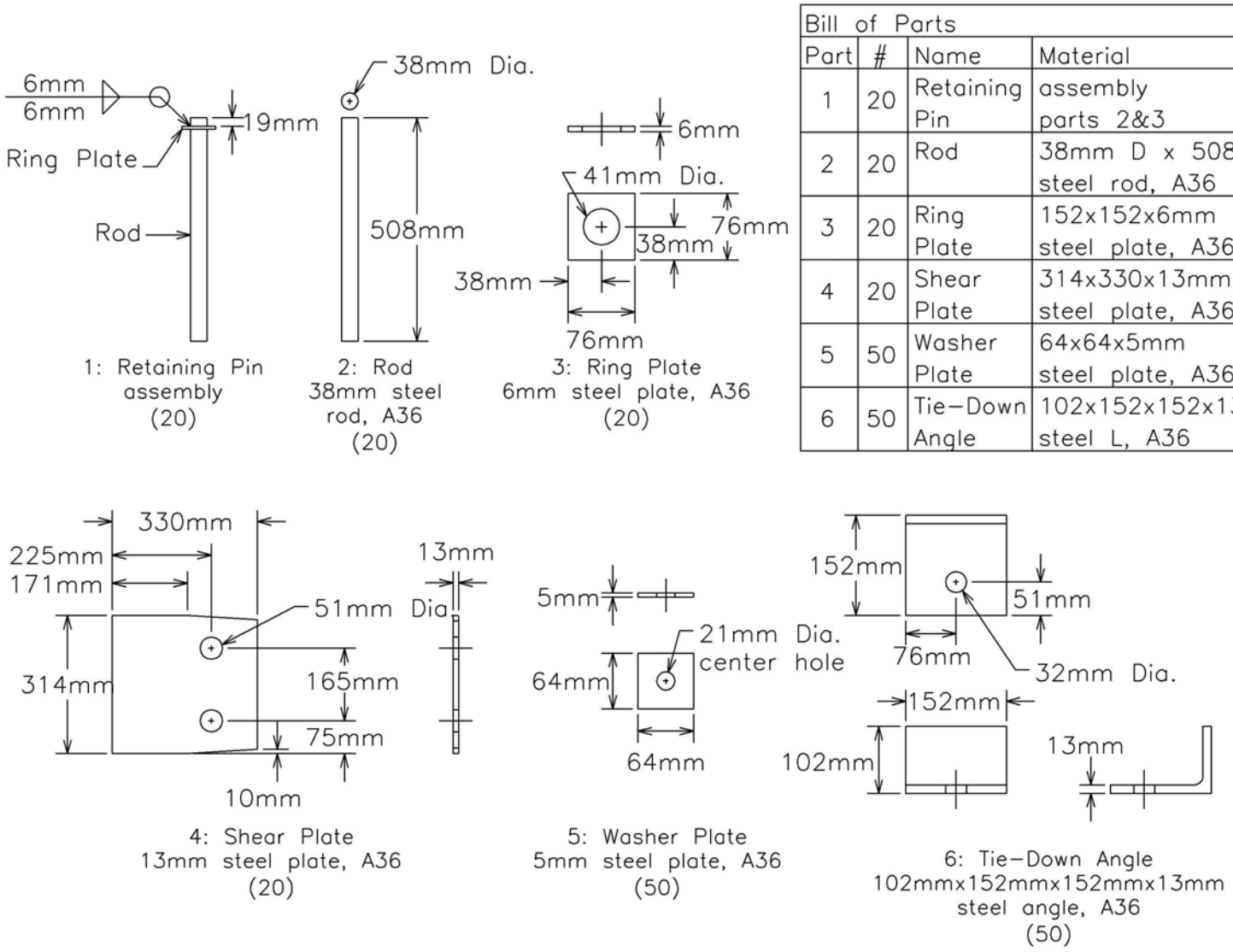


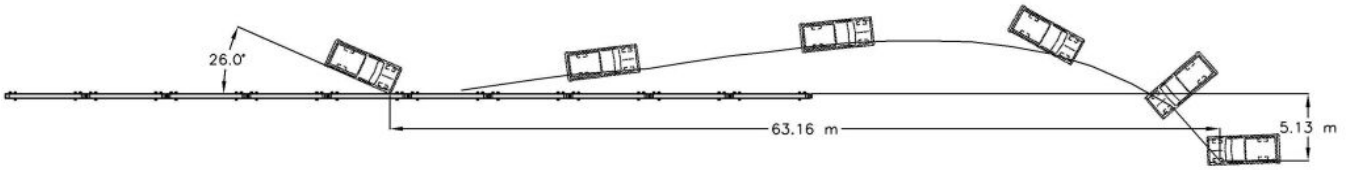
Figure 35. Steel H-section Temporary Barrier Splice Details (Design No. 2)



Bill of Parts			
Part	#	Name	Material
1	20	Retaining Pin	assembly parts 2&3
2	20	Rod	38mm D x 508mm steel rod, A36
3	20	Ring Plate	152x152x6mm steel plate, A36
4	20	Shear Plate	314x330x13mm steel plate, A36
5	50	Washer Plate	64x64x5mm steel plate, A36
6	50	Tie-Down Angle	102x152x152x13mm steel L, A36

Figure 36. Steel H-section Temporary Barrier Details (Design No. 2)

0.000 sec | 0.085 sec | 0.142 sec | 0.205 sec | 0.441 sec



- Test Number HTB-2
- Date 5/10/02
- Appurtenance . . . . . Tie-Down Steel H-Section Temporary Barrier
- Total Length . . . . . 61.25 m
- Placement from Bridge Deck Edge . 330 mm to back of rail
- Steel H-section Temporary Barriers
  - Material . . . . . ASTM A36 steel
  - Configuration . . . . . Two HP 356x109 mm by 6.1-m long beams stacked and connected by longitudinal welds
  - Splice Connections . . . . . Two 330x314x12.7 mm steel shear plates welded to HP webs with two 38-mm steel pins
- Barrier Tie-Downs
  - Material . . . . . ASTM A36 steel
  - Angle Brackets . . . . . Four 102x152x152x12.7-mm welded to the base of each side of the barrier
  - Drop-in Anchors . . . . . Four 19-mm Red Head drop-in anchors with ASTM A307 bolts and plate washers
- Soil Type . . . . . On dry pavement
- Vehicle Model . . . . . 1995 GMC 2500 ¾-ton pickup
  - Curb . . . . . 1,943 kg
  - Test Inertial . . . . . 1,988 kg
  - Gross Static . . . . . 1,988 kg
- Vehicle Speed
  - Impact . . . . . 100.7 km/hr
  - Exit (resultant) . . . . . 76.3 km/hr
- Vehicle Angle
  - Impact . . . . . 26.0 deg
  - Exit (trajectory) . . . . . 10.9 deg
- Vehicle Snagging . . . . . None
- Vehicle Pocketing . . . . . None
- Vehicle Stability . . . . . Satisfactory
- Occupant Ridedown Deceleration (10 msec avg.)
  - Longitudinal . . . . . 5.26 < 20 G's
  - Lateral (not required) 12.36
- Occupant Impact Velocity
  - Longitudinal . . . . . 5.60 < 12 m/s
  - Lateral (not required) 7.04
- Vehicle Damage . . . . . Moderate
  - TAD[13] 1-RFQ-3
  - SAE[14] 1-RFAW3
- Vehicle Stopping Distance . . . . . 63.16 m downstream 5.13 m laterally behind
- Barrier Damage . . . . . Minimal
- Maximum Deflections
  - Permanent Set . . . . . 241 mm
  - Dynamic . . . . . 314 mm
- Working Width . . . . . 725 mm

Figure 42. Summary of Test Results and Sequential Photographs, Test HTB-2