



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

January 18, 2000

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

Refer to: HMHS-CC12G

Dr. Hayes E. Ross, Jr.
Professor and Research Engineer
Texas Transportation Institute
The Texas A&M University System
College Station, Texas 77843-3135

Dear Dr. Ross:

In your December 17, 1999 letter, you requested the Federal Highway Administration's acceptance of a modified extruder head for use with any all of the previously-accepted terminal designs which used the ET-2000 extruder head. The new head, called the "ET-PLUS", differs from the original head in the size and shape of its face plate and in the omission or reduction in size of several of its non-structural components. The ET-PLUS is almost 100 pounds lighter than the original ET-2000 head. A comparison of the two designs is shown on Enclosure 1.

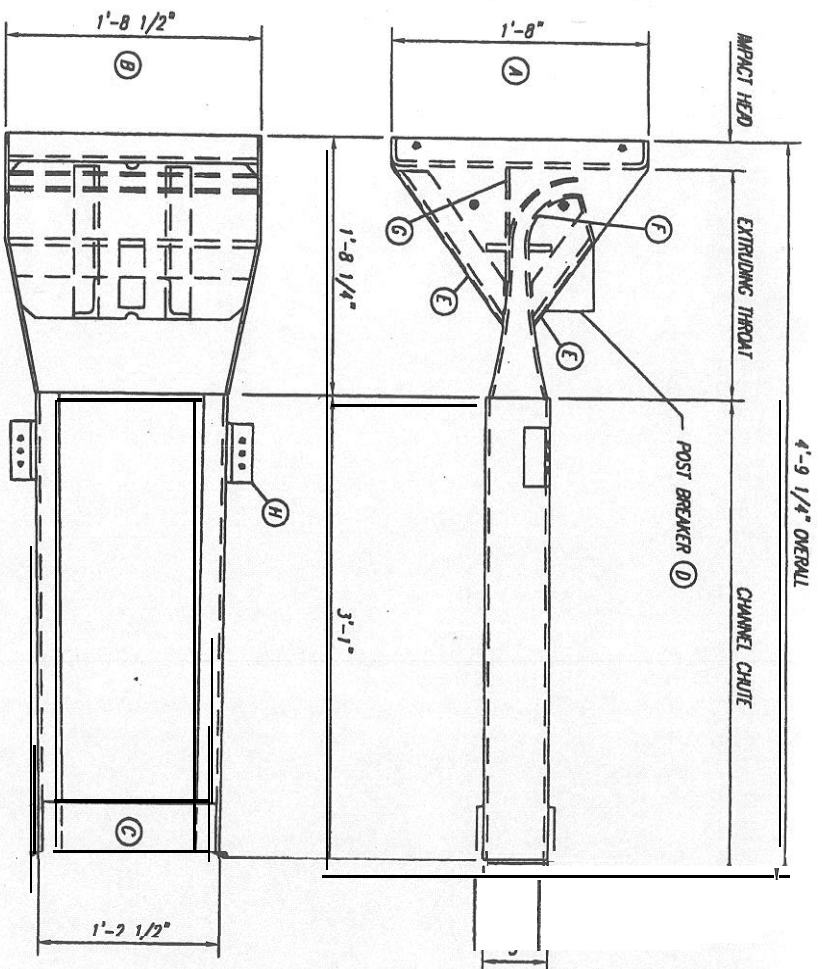
In support of your request, you sent me copies of a Texas Transportation Institute test report, dated December 1999, entitled "NCHRP REPORT 350 TEST 3-31 OF THE ET-2000 PLUS", by Menges, Buth, Ross, and Schoeneman, and copies of a videotape of that test. You stated that this end-on test with a 2000-kg pickup truck was the most critical to demonstrate acceptable performance of the modified extruder head, and that additional impacts at the end were not needed. You also stated that since no other changes were made in the terminal anchor design, none of the side impacts in the Report 350 test matrix were necessary. We agree with your conclusions.

Based on staff review of the results of test 3-31, as summarized in Enclosure 2, we agree that the ET-PLUS can be used in lieu of the original ET-2000 extruder head on any of the ET-2000 systems previously accepted for use on the National Highway System.

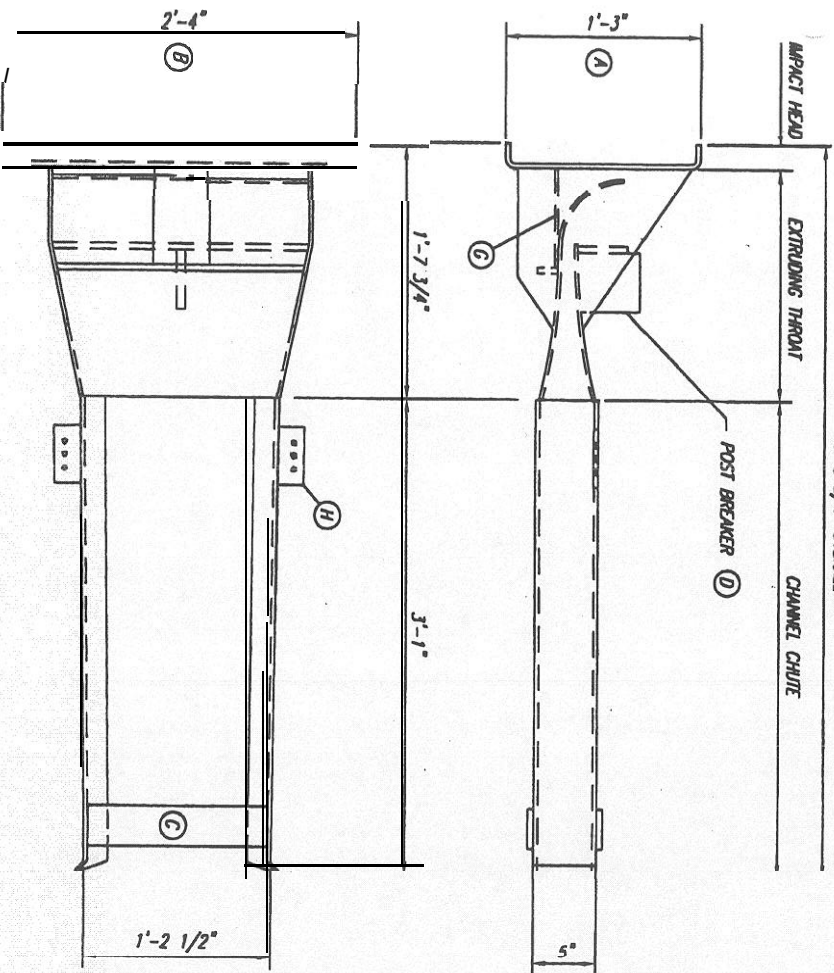
Sincerely yours,

Dwight A. Home
Director, Office of Highway Safety Infrastructure

2 Enclosures



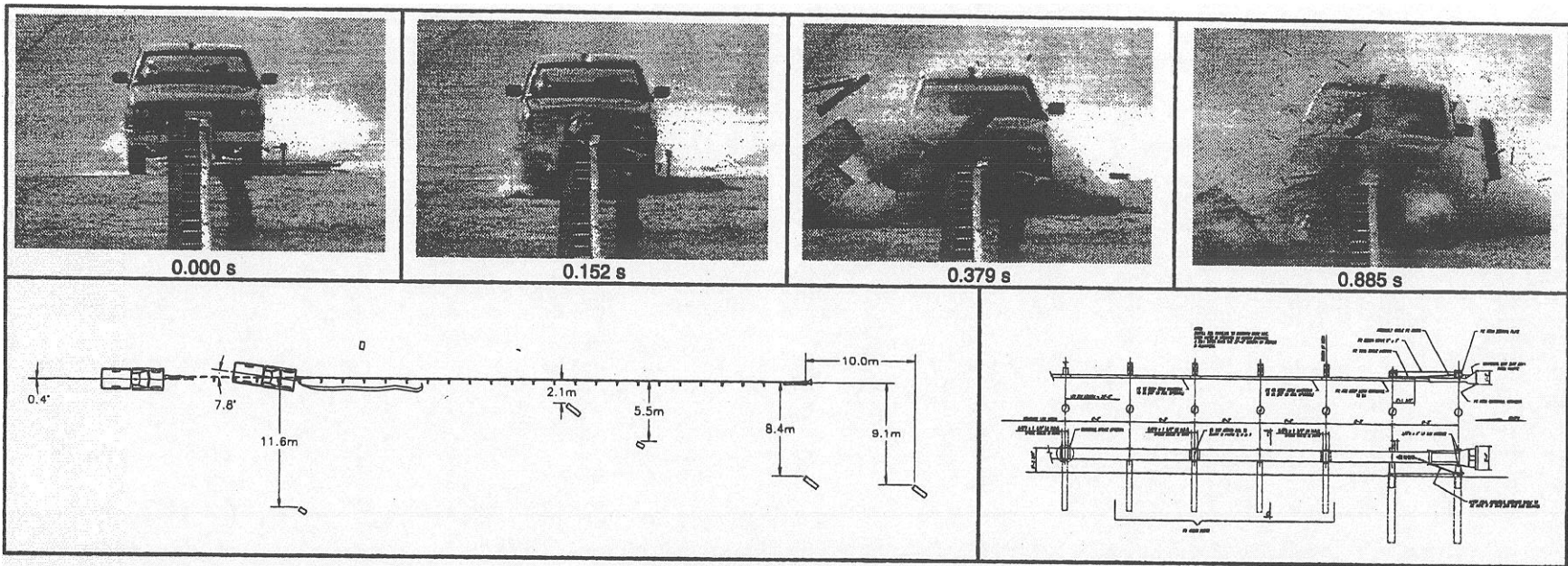
ET-2000 HEAD (268#)



ET PLUS HEAD (175#)

MATERIAL DIFFERENCE

	ET-2000	ET-PLUS
A	1'-8	1'-3
B	1'-8 1/2	2'-4
C	1/2 x 3	1/2 x 1 1/2
D	2	5/8
E		OMITTED
F		SHORTENED
G	9 x 1/4 x 20	6 x 1/4 x 8
H	12 x 2 x 4 1/2	PL 2 x 4 1/2
WT	268#	175#



General Information

Test Agency Texas Transportation Institute
 Test No. 400001-LET1
 Date 10/05/99

Test Article

Type Terminal
 Name ET-2000 PLUS
 Installation Length (m) 57.2
 Material or Key Elements ... ET-2000 PLUS Guardrail Extruder
 Terminal on Wood CRT Posts

Soil Type and Condition

..... Standard Soil, Dry

Test Vehicle

Type Production
 Designation 2000P
 Model 1994 Chevrolet 2500 Pickup Truck
 Mass (kg)
 Curb 1896
 Test Inertial 2000
 Dummy No Dummy
 Gross Static 2000

Impact Conditions

Speed (km/h) 100.3
 Angle (deg) 0.4

Exit Conditions

Speed (km/h) Stopped
 Angle (deg) N/A

Occupant Risk Values

Impact Velocity (m/s)
 x-direction 6.2
 y-direction 0.1
 THIV (km/h) 22.3
 Ridedown Accelerations (g's)
 x-direction -6.9
 y-direction 2.8
 PHD (g's) 7.3
 ASI 0.52
 Max. 0.050-s Average (g's)
 x-direction -6.1
 y-direction 1.0
 z-direction 3.4

Test Article Deflections (m)

Dynamic N/A
 Permanent 11.6

Vehicle Damage

Exterior
 VDS 12FC5
 CDC 12FCEW1
 Maximum Exterior
 Vehicle Crush (mm) 460
 Interior
 OCDI FS0000000
 Max. Occ. Compart.
 Deformation (mm) 0

Post-Impact Behavior

(during 1.0 s after impact)
 Max. Yaw Angle (deg) 5
 Max. Pitch Angle (deg) -8
 Max. Roll Angle (deg) -6

Figure 14. Summary of results for test 400001-LET1, NCHRP Report 350 test 3-31.