U.S. Department of Transportation
Federal Highway Administration

Memorandum

ject: ACTION: Wyoming Road Closure Gate

Date: MAR 24 1995

rom: Chief, Federal-Aid and Design Division

Reply to Attn. of: HNG-14

To: Mr. Vincent F. Schimmoller
Regional Federal Highway Administrator (HRA-08)
Lakewood, Colorado

This is in response to your January 20 memorandum requesting Federal Highway Administration's (FHWA) acceptance of the Wyoming Road Closure Gate as meeting breakaway requirements for use on the National Highway System. Transmitted with your memorandum were a video tape and report of tests on the Road Closure Gate conducted at the Texas Transportation Institute. The report is dated February 1994. The gate arm is mounted on a four-bolt slip-base luminaire support that was the subject of a crash test report dated August 1991, that you also enclosed. The gate arm is mounted at a height of 1.2 m. A drawing of the Road Closure Gate is attached.

Full-scale crash testing was conducted to assess the breakaway performance of the subject device mounted on a rigid concrete foundation. Requirements for breakaway supports are found in the American Association of State Highway and Transportation Officials' (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. These specifications have been adopted by the FHWA. Guidelines established in the National Cooperative Highway Research Program Report 350 were followed in conducting the tests and analyzing their results.

A summary of the crash test is presented below:

Test Number	Target Values	472280-1	472280-2	472280-3
Test Article Mass, kg	n/a	102	147	147
Pole Height, m	n/a	5.5	8.8	8.8
Vehicle Mass, kg	820	820	820	820
Impact Speed, km/h	35.0,100.0	34.7	31.8	104.0
Soil Type	n/a	Concrete	Concrete	Concrete
Occupant Impact Speed, m/s	5.0 maximum	1.7	2.3	3.2
Occupant Compartment Intrusion (Roof crush, mm)	150 maximum	163*	10	0
Stub Height, mm	102 maximum	100	102	102

The four 25.4-mm high strength steel slip bolts were torqued to 4.8 N-m and were held in place with a 28 gage keeper plate. The bolt circle diameter was 330 mm.

*The extensive occupant compartment intrusion resulted in this test being called a failure. The system was retested with a taller and more massive luminaire support. The increased height of the center of gravity of the system in tests 472280-2 and -3 permitted the test vehicle to travel beyond the hazard before significant contact was made by the pole.

The results of Tests 477280-2 and -3 meet the change-in-velocity, stub-height, and occupant compartment integrity requirements adopted by the FHWA. The Wyoming Road Closure Gate on an 8.8-m high luminaire support as shown in the drawing, is therefore acceptable for use on the National Highway System, within the range of conditions tested, if proposed by a State.

Our acceptance is limited to the breakaway characteristics of the slip-base mechanism and does not cover the structural features. Presumably the State will develop sufficient information on structural design and installation requirements to ensure proper performance.

Jerry L. Poston

Attachment

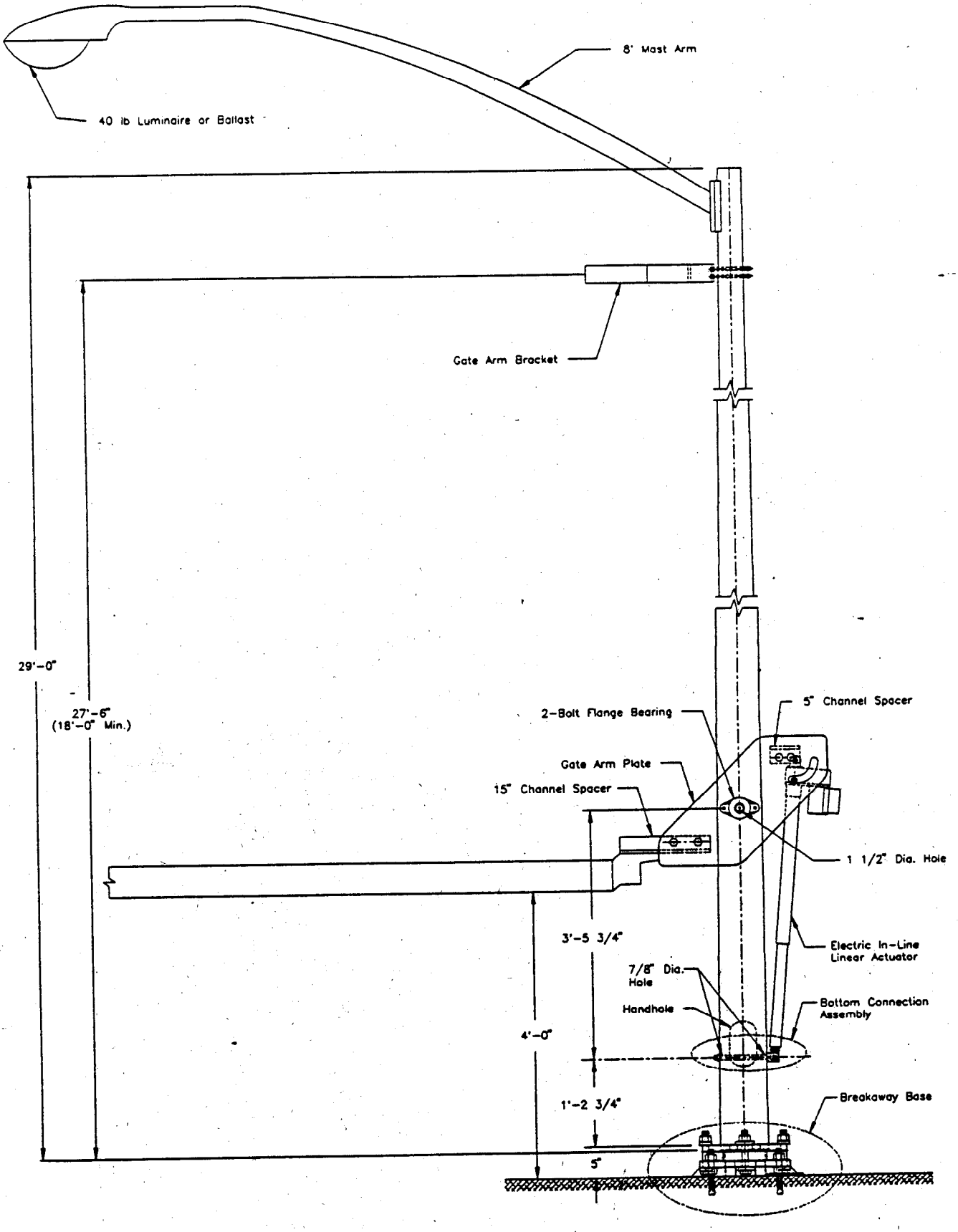
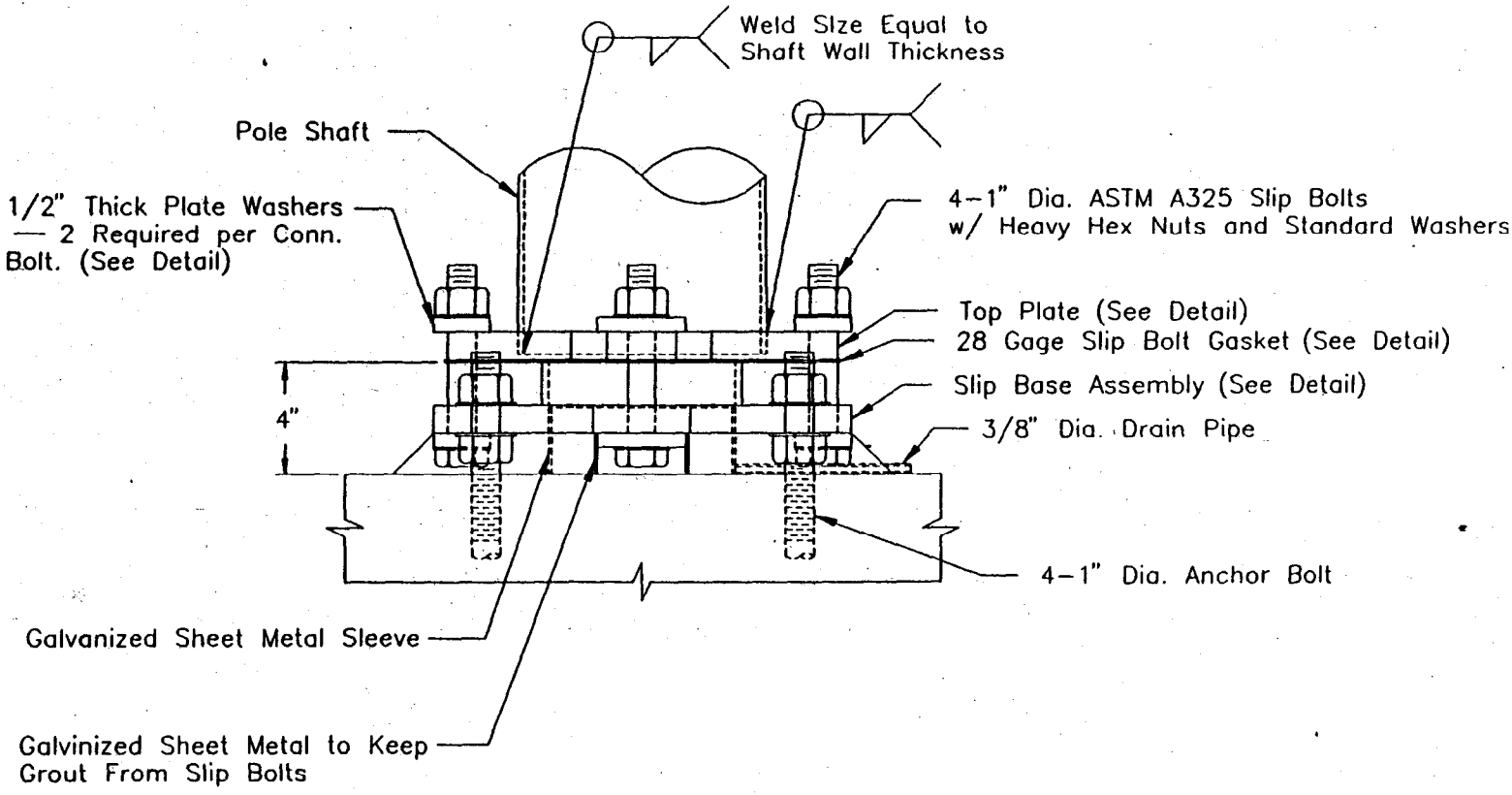


Figure 1. Schematic of road closure gate (arm down) as tested.



BREAKAWAY BASE

Figure 3. Schematic of 4-bolt slip base breakaway design.