



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

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

In Reply Refer To:  
HSA-10/SS-137

Mr. Robert Guthrie  
Operations Manager  
Brandon Industries, Incorporated  
1601 Wilmeth Road  
McKinney, Texas 75069-8250

Dear Mr. Guthrie:

Thank you for your April 4 letter requesting the Federal Highway Administration's (FHWA) acceptance of your company's Decorative Sign Supports as breakaway systems for use on the National Highway System (NHS). Accompanying your letter was a report from the Texas Transportation Institute and videos of the crash tests. You requested that we find five of these supports acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Introduction**

Testing of the supports was in compliance with the guidelines contained in the NCHRP Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features. Requirements for breakaway supports are those in the American Association of State Highway and Transportation Officials' Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

Here is a brief description of each system tested.

#### P1 (This system is not acceptable unless successfully tested at 100 km/hr)

This support was a 3.0-inch O.D. extruded fluted aluminum tube with a 0.125-inch wall. Two 0.06125-inch diameter holes were drilled, each at 60 degrees from the impact face and placed 1.0 inch above the top of a precast 6-inch diameter, 24-inch deep footing. One 24-inch diameter framed STOP sign and two cast aluminum street signs were mounted at 10 feet and 11 feet respectively above the ground. The pole and cap weighed 21 pounds and the signs weighed a total of 30 pounds.



P2 ( Systems P2 through P5 are acceptable for use)

This support was a 4.0-inch O.D. extruded fluted aluminum tube with a 0.125-inch wall. Four 0.25-inch diameter holes were drilled, at 30 degrees and 60 degrees from the impact face and placed 1.0 inch above the top of a precast 6-inch diameter, 24-inch deep footing. One 24-inch diameter framed STOP sign and two cast aluminum street signs were mounted at 10 feet and 11 feet respectively above the ground. The pole and cap weighed 21 pounds and the signs weighed a total of 30 pounds.

P3

This support was a 3.0-inch O.D. extruded fluted aluminum tube with a 0.125-inch wall. The tube was attached to a 2.0 x 2.0 x 12 ga. perforated square steel tube (PSST) with 0.075-in x 3.0-in hex head bolts. The PSST extended 14.25-in up into the aluminum tube. A 2.25 x 2.25 x 36-in long 12 ga. PSST extended to the bottom of a precast 6-inch diameter, 34-inch deep concrete footing. The top 18 inches was sleeved with a 2.5 x 2.5 x 12 ga PSST. One 24-inch diameter framed STOP sign and two cast aluminum street signs were mounted at 10 feet and 11 feet respectively above the ground. The pole, cap, and PSST weighed 23 pounds and the signs weighed a total of 30 pounds.

P4

This support was a 4.0-inch O.D. extruded fluted aluminum tube with a 0.125-inch wall. The tube was attached to a 2.0 x 2.0 x 12 ga. PSST with 0.075-in x 3.0-in hex head bolts. The PSST extended 12-in up into the aluminum tube. A 2.25 x 2.25 x 36-in long 12 ga. PSST extended to the bottom of a precast 6-inch diameter, 34-inch deep concrete footing. The top 18 inches was sleeved with a 2.5 x 2.5 x 12 ga PSST. One 24-inch diameter framed STOP sign and two cast aluminum street signs were mounted at 10 feet and 11 feet respectively above the ground. The pole, cap, and PSST weighed 25 pounds and the signs weighed a total of 30 pounds.

P5

This support was a 4.0-inch O.D. extruded fluted aluminum tube with a 0.125-inch wall. The tube was attached to a 2.0 x 2.0 x 12 ga. PSST with 0.075-in x 3.0-in hex head bolts. A cast aluminum bushing was placed between the PSST and the inside of the aluminum tube. The PSST extended 14.25-in up into the aluminum tube. A 2.25 x 2.25 x 36-in long 12 ga. PSST tube extended to the bottom of a precast 6-inch diameter, 34-inch deep footing. The top 18 inches was sleeved with a 2.5 x 2.5 x 12 ga PSST. One 30-inch diameter framed STOP sign and two cast aluminum street signs were mounted at 11 feet and 12 feet respectively above the ground. The pole, cap, and PSST weighed 23 pounds and the signs weighed a total of 39 pounds.

**Testing**

Pendulum testing was conducted on your company's devices. The mass of the pendulum bogie was 839 kg in all tests. The complete devices as tested are shown in the enclosures.

Test #	NCHRP 350	Version	Occup. Speed	Delta V
P1*	3-70	3" O.D. w/ two small holes	5.0 m/s *	5.0 m/s *
P2	3-70	4" O.D. w/ four larger holes	None	1.9 m/s
P3	3-70	3" O.D. supported on PSST	None	0.9 m/s
P4	3-70	4" O.D. supported on PSST	None	2.1 m/s
P5	3-70	4" O.D. on PSST, with bushing	None	Unknown

Occup. Speed: Occupant Impact Speed: Speed at which a theoretical front seat occupant will contact the windshield. In meters per second. "None" indicates that the occupant would not have moved forward enough to hit the windshield during the impact.

Delta V: Speed change of the test vehicle. In meters per second.

\* The results of test P1 are at the limit of acceptability. NCHRP Report 350 requires that breakaway supports be qualified at both 35 km/hr and 100 km/hr. Through experience we know that the 35 km/hr results for tests P2 through P5 indicate that the 100 km/hr test is very likely to be acceptable. We do not have that same certainty for the marginal results of Test P1.

### Findings

Velocity changes were all within acceptable limits for tests P2 through P5, and the only stubs remaining were less than 4 inches or were not substantial. The results of testing met the FHWA requirements and, therefore, the devices described and tested as P2, P3, P4, and P5 above and shown in the enclosed drawings for reference are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a State.

Please note the following standard provisions that apply to the FHWA letters of acceptance:

- Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number SS-137 shall not be reproduced except in full. As this letter and the supporting documentation which support it become public information, it will be available for inspection at our office by interested parties.

- Brandon Industries sign supports are patented devices and considered "proprietary." When proprietary devices are *specified by a highway agency* for use on Federal-aid projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely yours,

John R. Baxter, P.E.  
Director, Office of Safety Design  
Office of Safety

Enclosure

FHWA:HSA-10:NArtimovich:tb:x61331:6/8/06  
File: h://directory folder/artimovich/SS137-BrandonFIN.doc  
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;  
N.Artimovich, HSA-10)

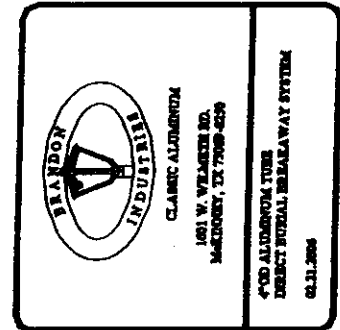
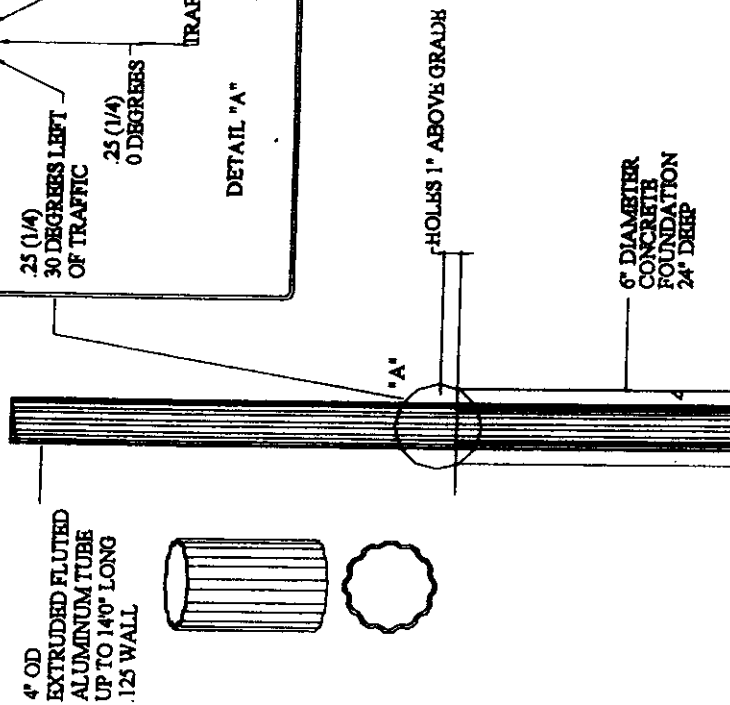
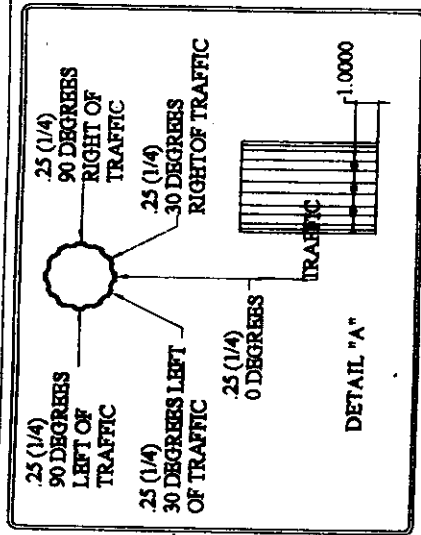


Figure C3. Details of the decorative sign post used in test DES P2.

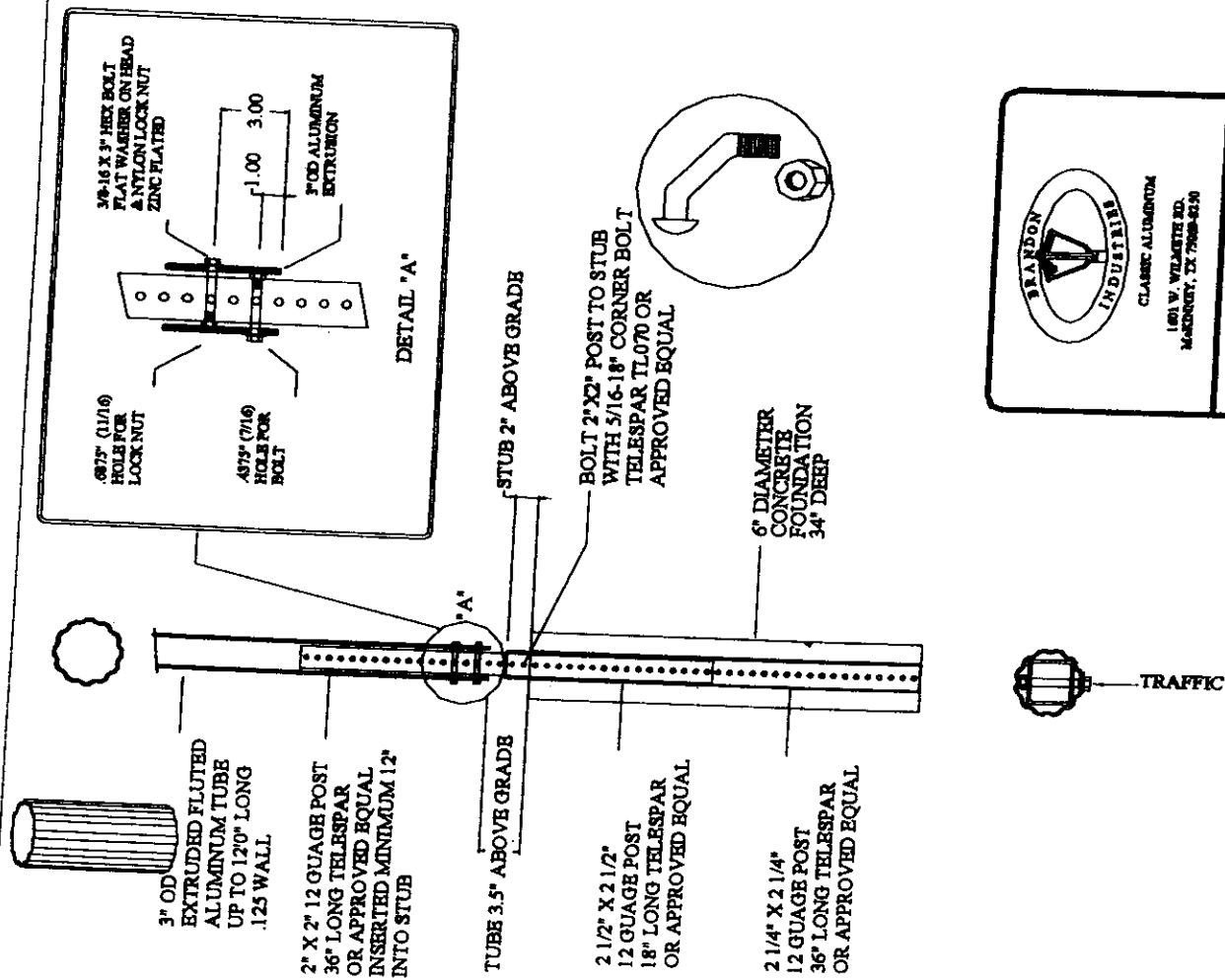


Figure C4. Details of decorative post used in test DES P3.

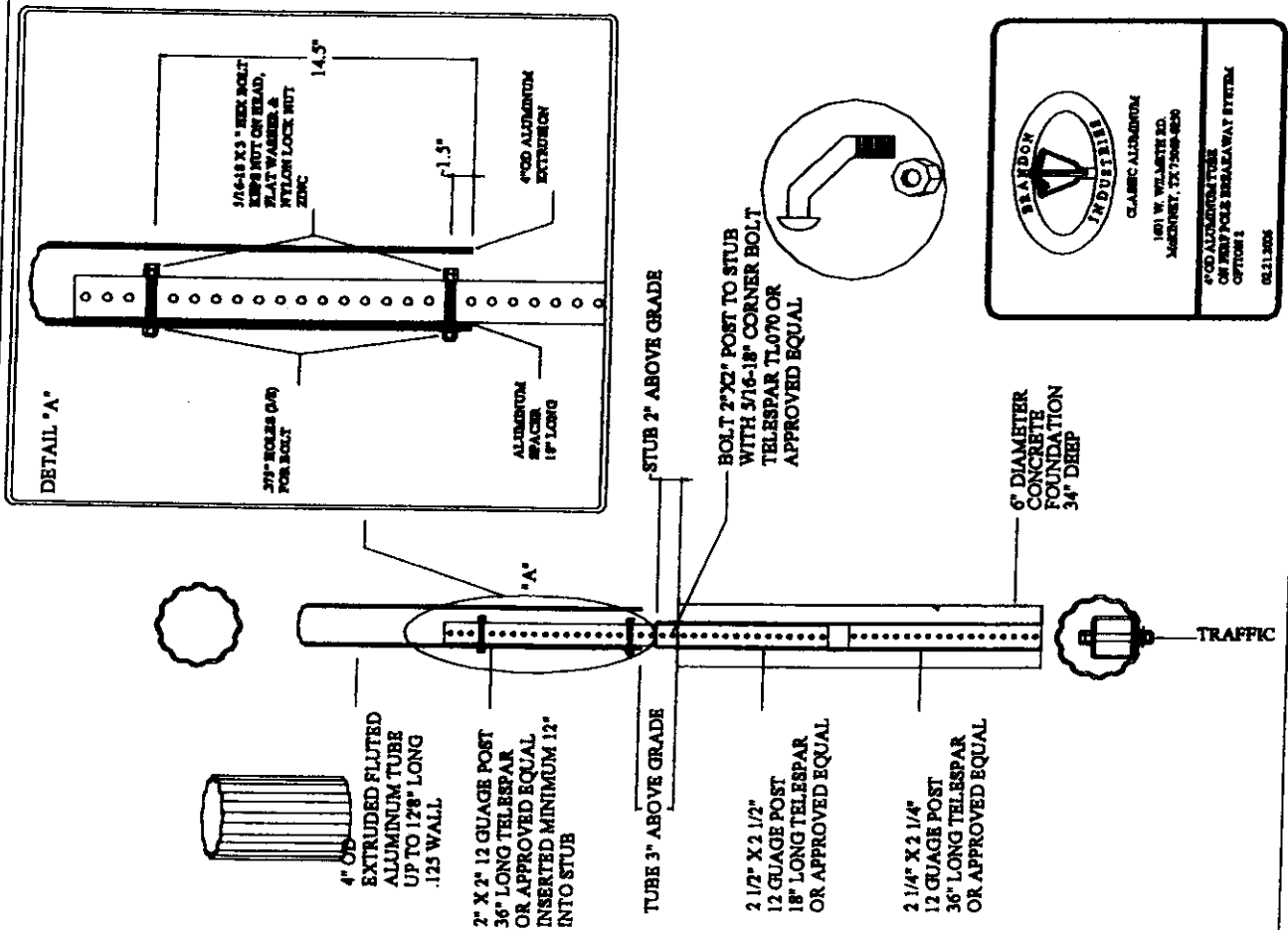


Figure C5. Details of decorative post used in test DES P4.

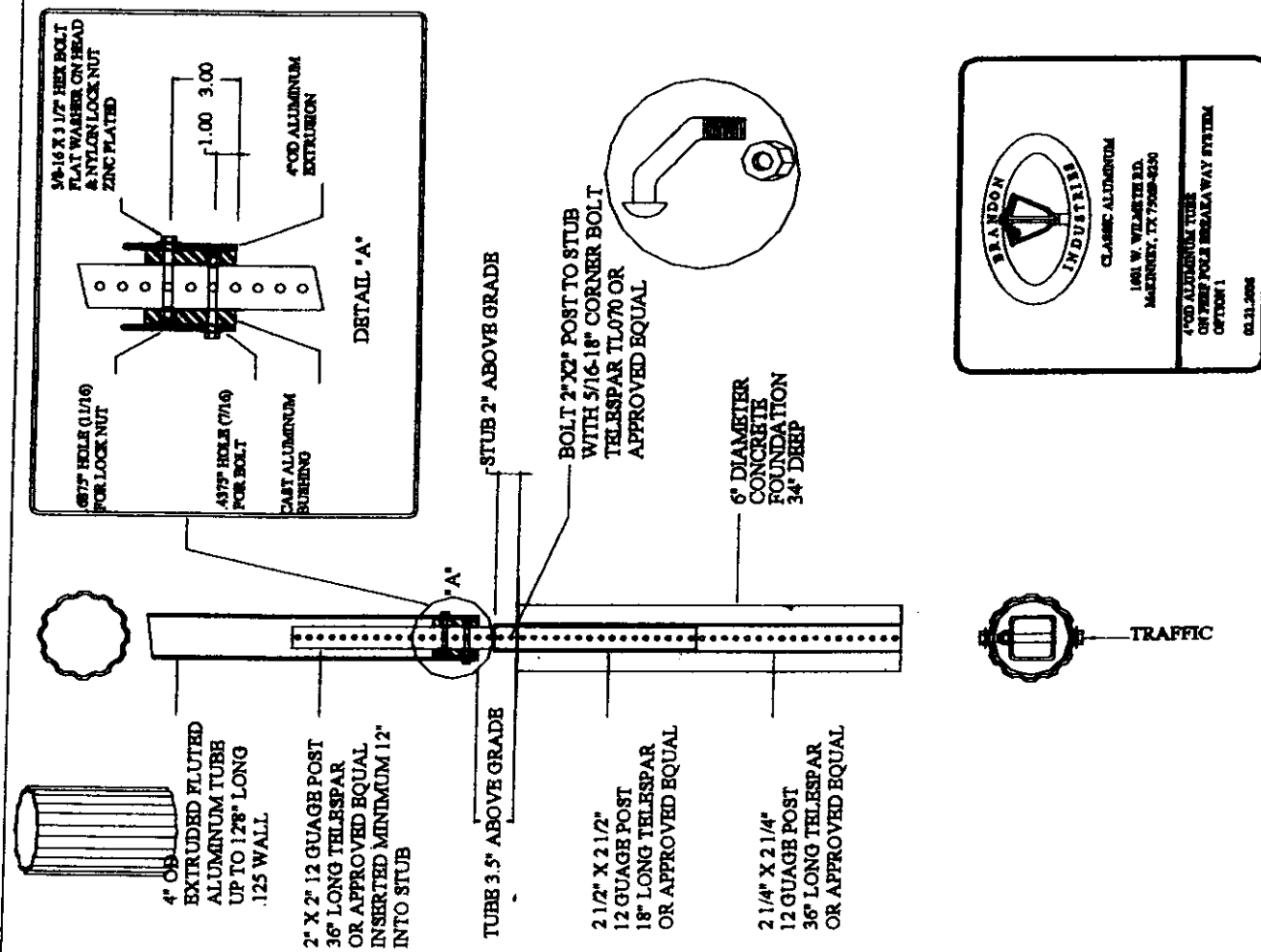


Figure C6. Details of decorative post used in test DES P5.