U.S. Department
of Transportation
Federal Highway Administration

February 9, 2006

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

In Reply Refer To:
HSA-10/SS-132

Mr. Mark T. Salman, President
Sign Support Systems
P.O. Box 8041
Greensboro, NC 27419

Dear Mr. Salman:

Thank you for your letter of November 28, 2005, requesting Federal Highway Administration (FHWA) acceptance of a new model of your company's Break Out Coupler for perforated square steel tubes as a breakaway sign support system 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 the new Break-Out Coupler acceptable for use on the NHS under the provisions of 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' (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

The Break-Out Coupler is a cast-iron (ASTM A536 65-45-12 alloy) coupling with a shear section machined to a pre-set diameter to ensure breakaway performance of up to a maximum of 90 percent of the yield strength of the post it is used with. It was originally found acceptable in our letter SS-98 dated August 29, 2001, with U-channel posts and 2-inch perforated square steel tube (PSST) sign supports. The new version you have recently tested is designed for 2 ½ inch PSST supports. The cast neck of this model is subsequently machined with a groove that yields a final diameter of 1.900 inches.

The sign support was 2 ½ inch x 2 ½ inch North West Pipe PSST with 12 gage fins (soil anchor). The 48x48x5/8 inch plywood sign panel was attached using 3/8 inch x 4-inch bolts 6 inches from the top and bottom of the sign panel. The two-piece Break-Out casting was held

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together with 1/2 inch x 3 inch grade 8 flange bolt. The PSST support was secured into the Break Out casting with two 5/16 x 4 inch grade 5 hex-head bolts.

Testing

Pendulum bogie testing was conducted on your company's devices. The mass of the bogie test vehicle was 839 kg in all tests. Two similar tests were run in the NCHRP Report 350 Standard Soil to verify the consistent performance of the Break Out Coupler. Both tests included the installation of a soil anchor just below the surface. A plywood sign panel was mounted to the impact face of the PSST at a height of 7 feet to the bottom. The complete devices as tested are shown in the enclosures.

Test #	NCHRP 350	Impact Speed	Version	Delta V	Est. 60 mph Delta V
SKD-P1	Test 3-60	35.0 km/hr	Soil Plate	1.8 m/s	0.7 m/s
SKD-P2	Test 3-60	35.1 km/hr	Soil plate	1.5 m/s	0.7 m/s

Occupant Impact Speed: Speed at which a theoretical front seat occupant will contact the windshield. In these two tests the device did not slow the vehicle enough to result in an occupant impact, i.e. "no contact."
Delta V: Speed change of the test vehicle. In meters per second.
Est. 60 mph Delta V: Delta V of a theoretical high-speed test estimated using data from the pendulum test.

Findings

Velocity changes were all within acceptable limits, and the only stub remaining was flush with the level of the surrounding soil. The anchor moved 1.1 inches in the soil during test SKD-P1 and moved 0.24 inches during test SKD-P2. The results of testing met the FHWA requirements and, therefore, the devices described 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-132 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.
- The Break Out Coupler is a patented device and is considered "proprietary." When proprietary devices are *specified by a highway agency* for use on Federal-aid projects they: (a) 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.

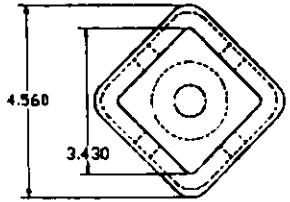
Sincerely yours,

/original signed by/

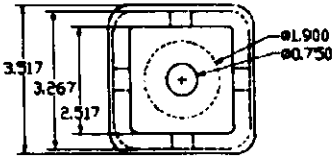
John R. Baxter, P.E.
Director, Office of Safety Design
Office of Safety

Enclosures

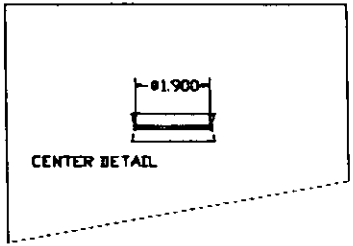
FHWA:HSA-10:NArtimovich:tb:x61331:2/2/06
File: h://directory folder/artimovich/SS132-BreakOutFIN.doc
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
N.Artimovich, HSA-10)

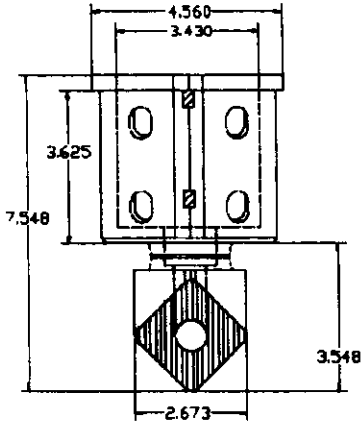


TOP VIEW AT R135



TOP VIEW AT R180





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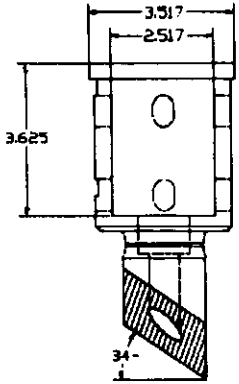

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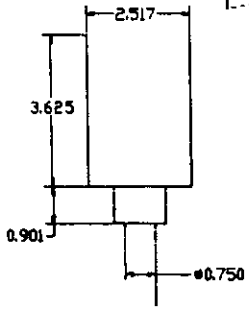
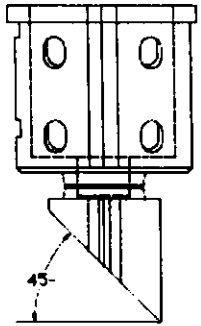
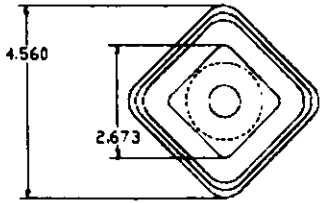


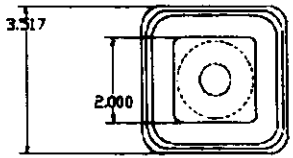
FEMALE DIMS AT R180



SIDE VIEW AT R225



BOTTOM VIEW AT R135



BOTTOM VIEW AT R180

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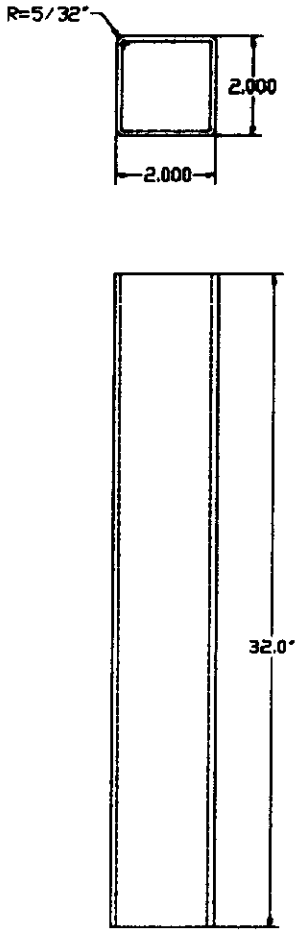
MATERIAL
65-45-12

BREAK-OUT FLUSH MOUNT (2-1/2") SQUARE 12GA (NON SCOPE)

DR: PDT: 6-8-05

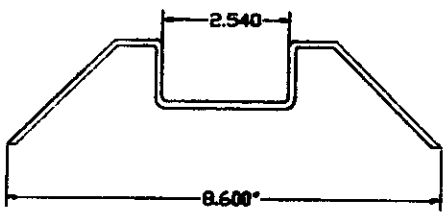
SIZE | PROJ NO. | DWG NO. BOS212-12 | REV

SCALE | SHEET

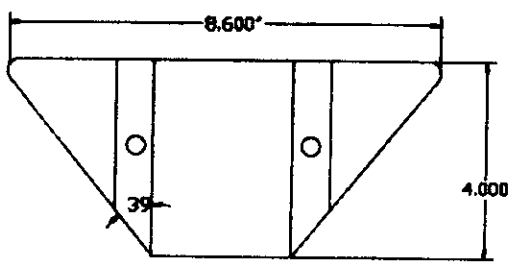


MATERIAL: ASTM A653 - 650 GALVANIZATION G90 2" SQUARE TUBING 3.07 LB/FT II 8A	THIS DRAWING IS THE PROPERTY OF SIGNAL INC., IT IS NOT INTENDED FOR REPRODUCTION OR DUPLICATION WITHOUT APPROVAL OF THE CORPORATION.
	SOIL EXTENSION 32"
	SIZE / FSCM NO. / DWG NO. / REV
DR: DTE: 05-09-05	SCALE N/A / SHEET

TOP VIEW



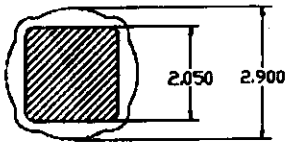
SIDE VIEW



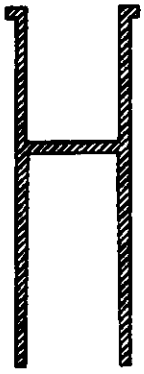
MATERIAL: MILD STEEL 1018 1/8"	THIS DRAWING IS THE PROPERTY OF [illegible], INC., IT IS NOT INTENDED FOR DISTRIBUTION OR REPLICATION WITHOUT APPROVAL OF THE CORPORATION.
	STABILIZER 2.5"
	SIZE / FSCM NO. / DWG NO. / REV
DR: DTE: 05-09-03	SCALE N/A / SHEET

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

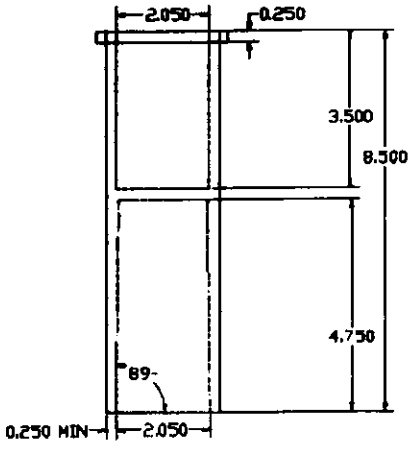
TOP END VIEW



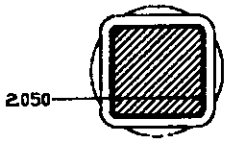
SECTIONAL VIEW



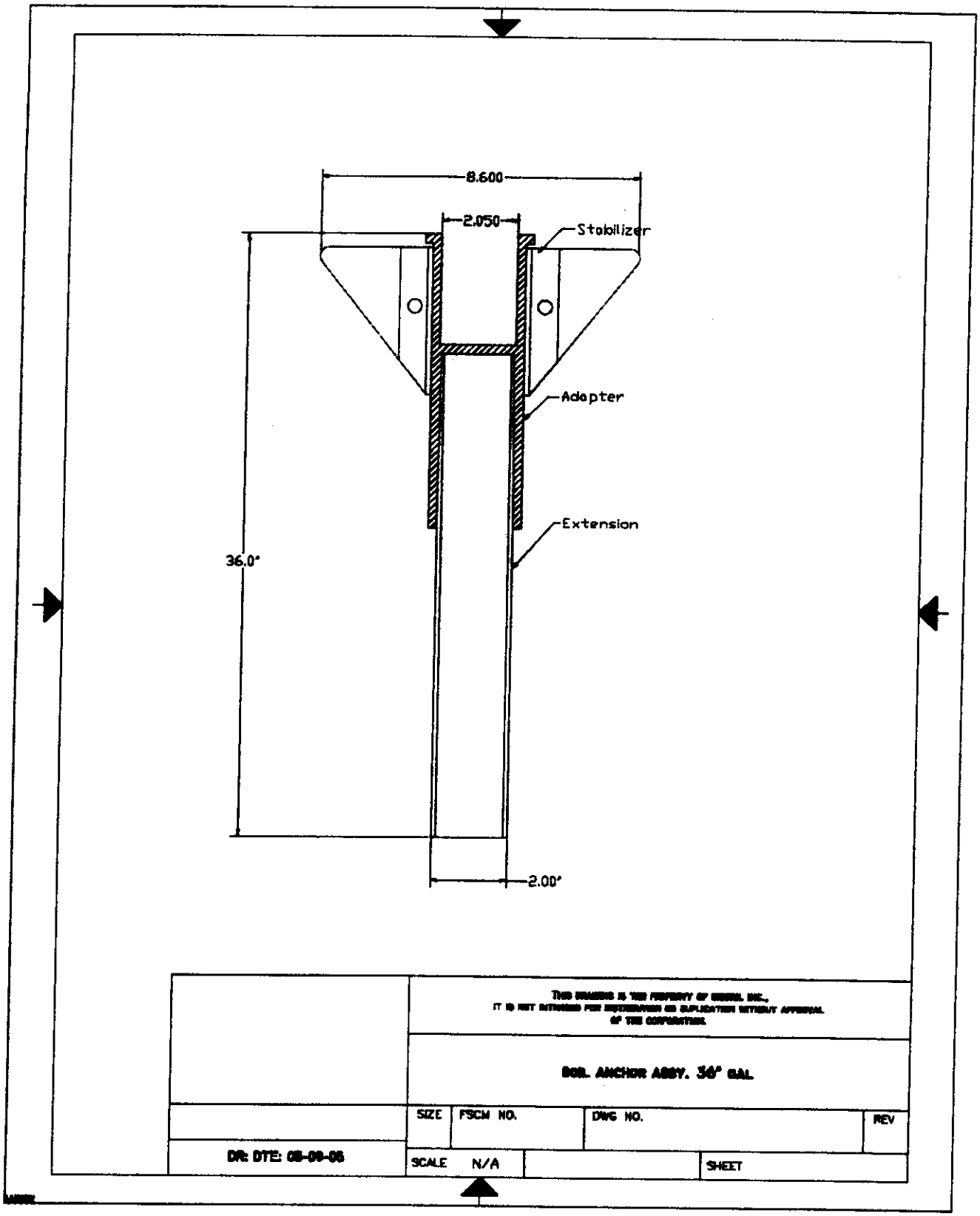
SIDE VIEW



BOTTOM END VIEW



MATERIAL:	THIS DRAWING IS THE PROPERTY OF SWAGELOK CO., IT IS NOT INTENDED FOR DISTRIBUTION OR DUPLICATION WITHOUT APPROVAL OF THE CORPORATION.			
STEEL 1018	ADAPTER			
	SIZE	FSCM NO.	DWG NO. HDA200-OBA	REV
	SCALE			SHEET


8.600
2.050
Stabilizer
Adapter
Extension
36.0"
2.00"
BOR. ANCHOR ASSY. 36" GAL
SIZE
FSCM NO.
DWG NO.
REV
SCALE N/A
SHEET
DR: DTE: 05-09-05