



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

August 29, 2006

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

In Reply Refer To:  
HSSD/SS-141

Mr. Jeff Anderson  
POCO Incorporated  
42000 Van Born Road  
Canton, Michigan 48188

Dear Mr. Anderson:

Thank you for your letter of June 3, 2005, and email correspondence of June 14, 2006, requesting the Federal Highway Administration's (FHWA) acceptance of your company's ground-mounted sign support as a breakaway device for use on the National Highway System (NHS). Accompanying your correspondence were reports from Karco Engineering and video documentation of the testing. You requested that we find the POCO Incorporated Driven Sign Stand 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.

The POCO Incorporated driven sign stand consists of two main parts: the sign panel and the support structure. The support structure is made up of two (2) vertical supports. These supports are composed of ninety-six inch (96") long by fourteen (14) gage wall thickness by one and one-half inch (1.5") square cold rolled steel tubing. Each support mast is stiffened with a 48" long section of nominal 1" schedule 40 steel pipe. This pipe is inserted into the 'bottom' portion of the mast and spot welded in place. Each mast is further drilled with four 3/8" diameter holes, placed 1" and 12" from each end.

The 5/8" thick plywood sign panel is attached to the masts with four (4) 5/16" diameter by 3-1/2" long hex head bolts and Nylok nuts. A 1/16" thick fender washer is placed between the



head of each bolt and the face of the plywood and a 5/8" thick by 1-1/4" outside diameter by 3/8" inside diameter spacer is placed on the bolt between the back of the plywood and the mast.

The sign also has a Type A warning light (Empco-Lite Model 400) attached to one of the corners. This light is mounted with a 1/2"-13 bolt through a 9/16" hole, with a "cup washer" placed under the bolt head. The light is further held in position by the use of a "Z-bracket". The light contains at least one battery. The battery is placed in the outermost 'pocket' in the light case.

The masts are attached to 3 pound-per-foot 'U-channel' post sections, approximately forty-eight inches to sixty inches (48"-60") in length. These sections of 'U-channel' are embedded thirty-six to forty-eight inches (36"-48") in soil, with a minimum of twelve-and-one-half inches (12.5") protruding above ground.

Two (2) bolts are used to attach each mast to each 'U-channel' section. 5/16"-18 zinc plated bolts with Nylok nuts are placed through the holes drilled 1" and 12" from the bottom end of each mast, and through available holes in the 'U-channel' post section.

The total height of the assembly is approximately 128" and the total weight is approximately 95 pounds.

### Testing

Full-scale automobile testing was conducted on your company's devices. The u-channel stubs were driven into standard soil. The complete devices as tested are shown in the enclosures.

Test Report	NCHRP	Vehicle Mass (kg)	Speed (km/hr)	Occup. Impact Speed (m/s)	Delta V (m/s)
TR-P25079-01-NC	3-61	794	100.57	2.7	Unknown
1-61	3-60	815	37.57	1.4	1.3

Occup. Speed: Occupant Impact Speed: Speed at which a theoretical front seat occupant will contact the windshield. In meters per second.

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

### Findings

Damage was limited to dents to the bumper, grille, and hood, with windshield cracking occurring in only the high-speed test. There was a maximum deflection of 1 inch to the windshield. Velocity changes were all within acceptable limits. As the u-channel anchor posts broke off below the ground line there were no stubs remaining. 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-141, 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 Poco Incorporated Driven Sign Stand includes features for which a patent has been applied for, and is therefore 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; (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:HSSD-10:NArtimovich:tb:x61331:8/28/06

File: h://directory folder/artimovich/SS141-POCO.doc

cc: HSSD (Reader, HSA; Chron File, HSSD; N.Artimovich, HSSD;  
MMcDonough, HSSD)

Rigid Panel Sign Support System

4'-5" long - 3 lb. "U-channel stub" driven into firm soil, leaving a minimum of 12.5" projecting above grade.

Mast fastened to stub with (2) 5/16-18 bolts with Nylok nuts, located 1" and 12" from the bottom end of the sign mast.

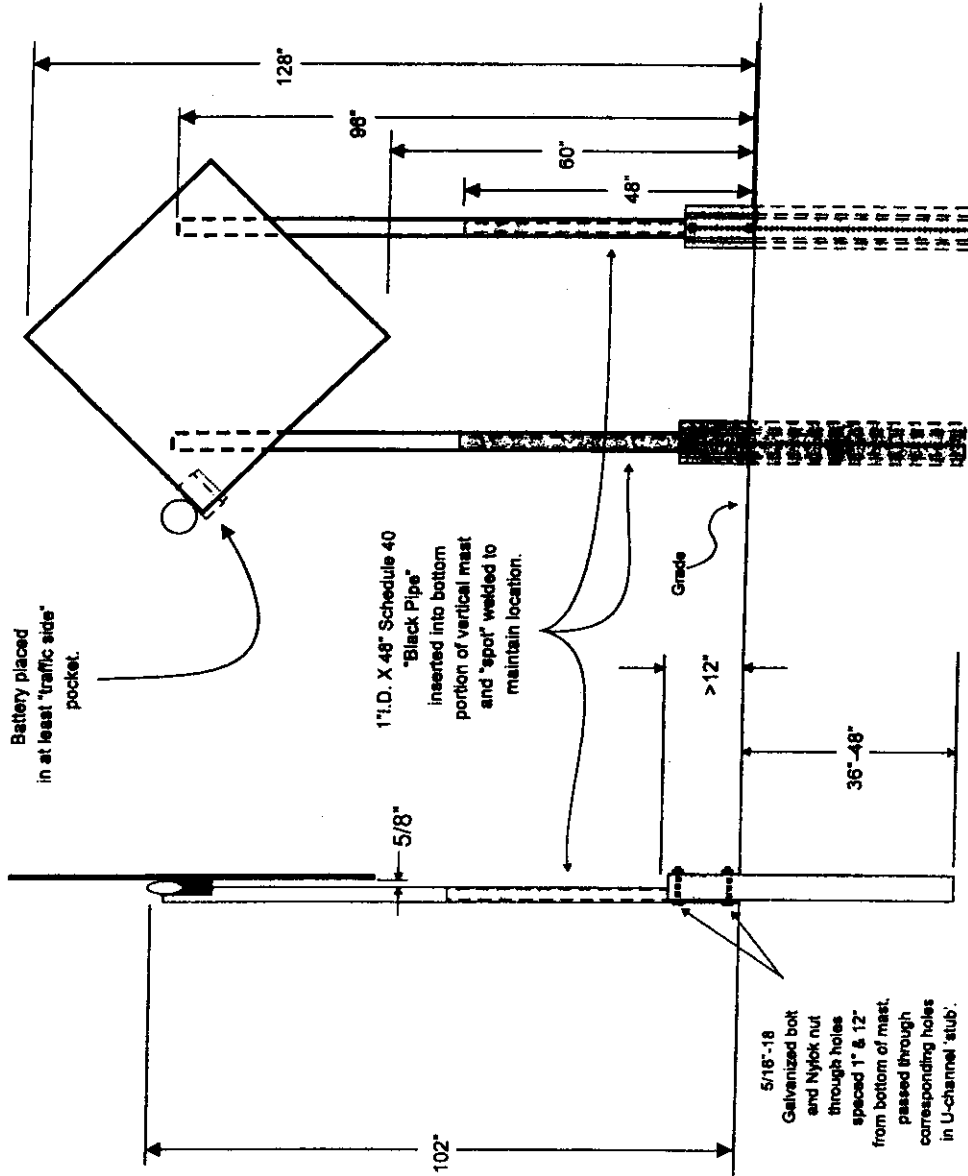
Vertical mast - 1.5" x 1.5" x 14 gauge wall x 96" Cold Rolled Steel Tubing. 1" inside diameter x 48" long section of schedule 40 pipe inserted into bottom of leg, and maintained in position via a small "spot" of weld at the bottom of the leg.

Vertical mast members punched with .3438" hole at 4 (four) locations for mounting bolts (1" and 12" from each end).

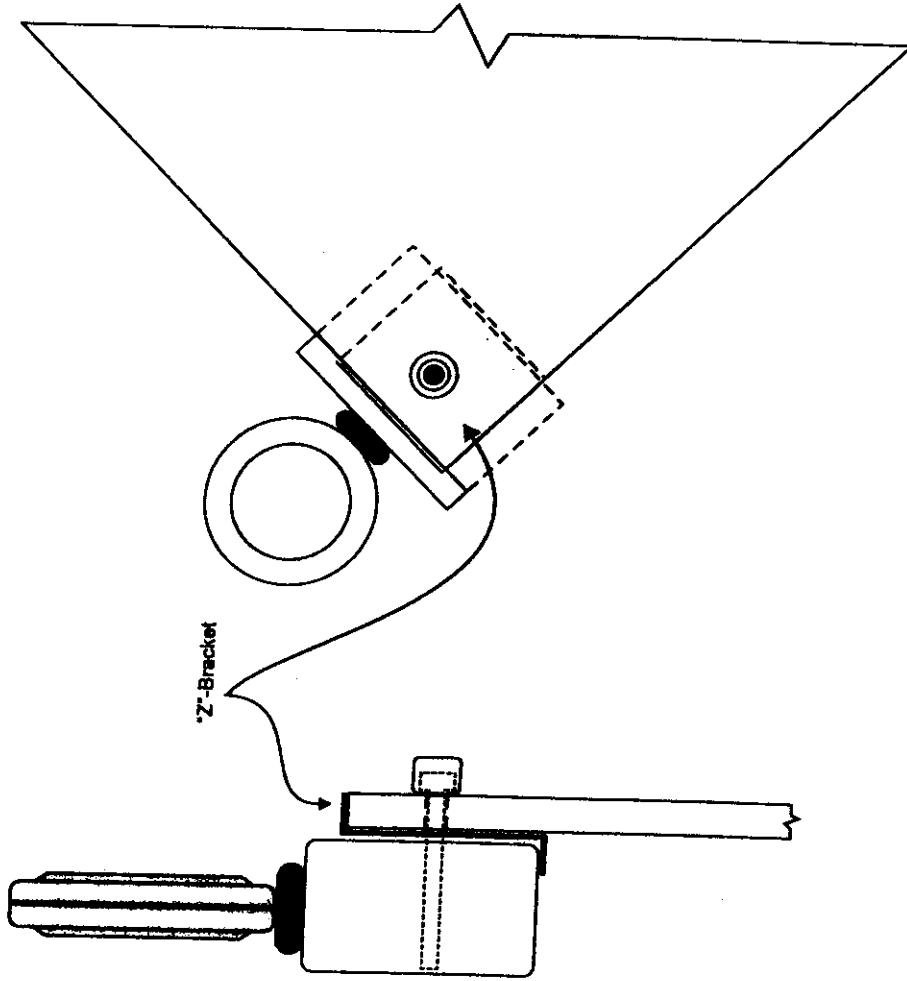
Panel - Reflective plywood, .625" thick x 48" x 48".

Panel fastened to vertical mast supports with 5/16-18 by 3.5" long zinc plated bolts with .063" thick fender washer under the bolt head, and a .625" thick by 1.25" diameter spacer placed between the back of the sign panel and the front of the vertical mast at each mounting location, and a 5/16-18 Nylock nut.

Light - Empco-lite model number 400, Type A warning flasher mounted to the corner of the sign panel with 'lantern' type battery placed in both, or at least the 'outer' position in the case. Light is mounted to sign panel using 1/2"-13 bolt, through .563" hole, utilizing a 'cup washer'. Light is further stabilized by utilizing a "Z-plate" between the plywood and the light. (See attachment)



Company	Poco Incorporated		
Project Name	NCHRP 350 Sign - driven configuration		
Sheet Number	1	Date	May 15, 2005
Prepared By	J. Anderson		



Company

Poco Incorporated

Project Name

NCHRP 350 Sign - driven configuration

Phone

734-397-1677

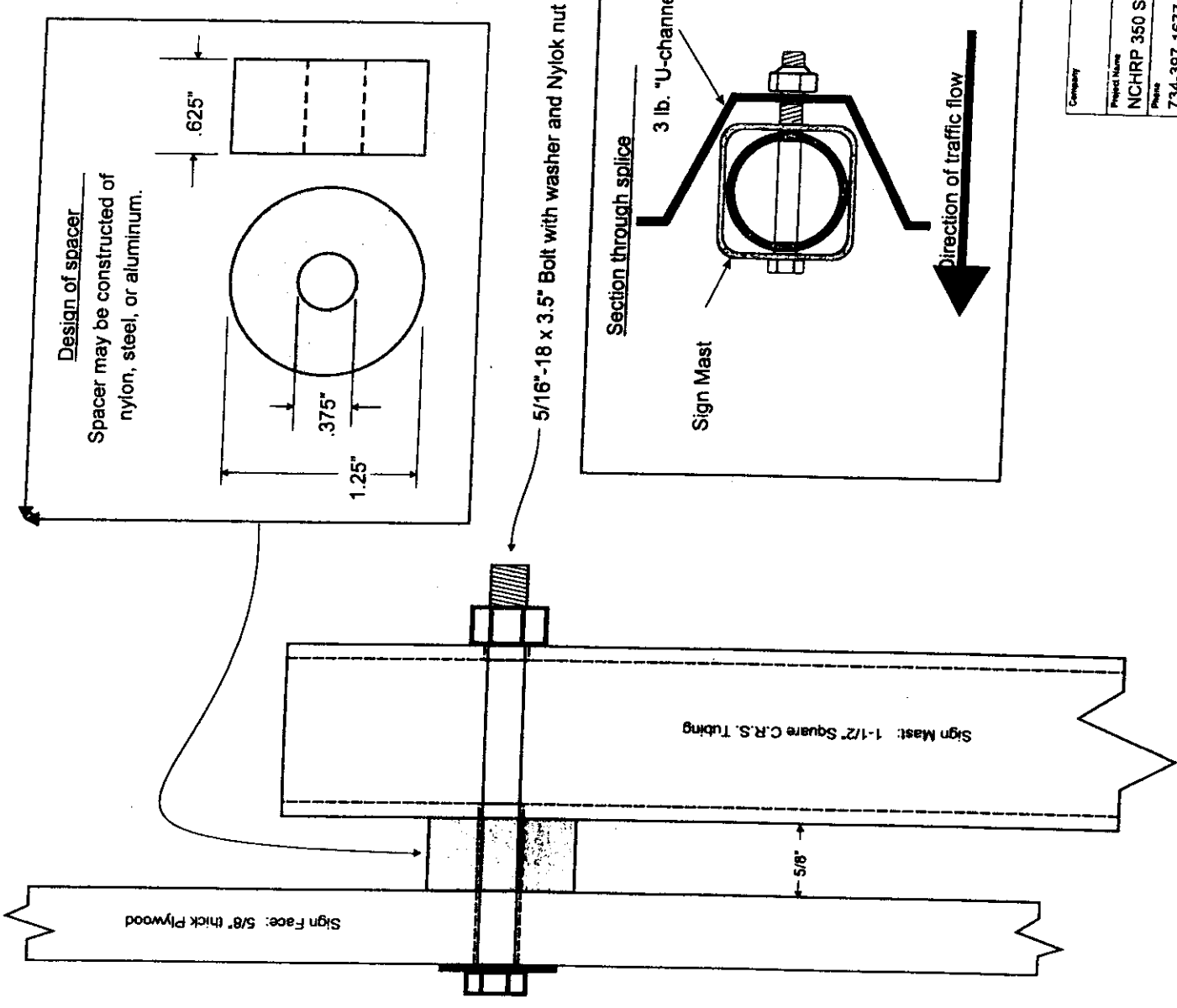
Sheet Number

2

Prepared By

J. Anderson

May 15, 2005



Company	Poco Incorporated
Project Name	NCHRP 350 Sign - driven configuration
Phone	734-397-1677
Sheet Number	3
Date	May 15, 2005
Prepared By	J. Anderson

SUMMARY OF RESULTS FOR TEST NO. 3-70

GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO ENGINEERING	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	3-70	X-DIRECTION	1.4
DATE	01/18/06	Y-DIRECTION	0.2
TEST ARTICLE		THIV (optional)	
TYPE	POCO 4X4 SIGN - BOTTOM DRIVEN	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH (m)		X-DIRECTION	-0.5
SIZE AND/OR DIMENSION OF KEY ELEMENTS	LESS THAN 45 Kg	Y-DIRECTION	-0.3
SOIL TYPE AND CONDITION	CLASS II ROAD BASE++	PHD (optional)	
TEST VEHICLE	820C	ASI (optional)	
TYPE	PRODUCTION	TEST ARTICLE DEFLECTIONS (m)	
DESIGNATION	3-70	LONGITUDINAL	N/A
MODEL	CHEVROLET METRO	LATERAL	N/A
MASS (CURB)	810 kg (1784 lbe)	VEHICLE DAMAGE	
MASS (TEST INERTIAL)	815 kg (1798 lbe)	EXTERIOR	
DUMMY(S) MASS	75 Kg (165 lbe)	VDS	1FR1
GROSS STATIC WEIGHT	893 kg (1968 lbe)	CDC	12RDEN1
IMPACT CONDITIONS		INTERIOR	
SPEED (km/h)	37.57 km/h (23.35 mph)	OCDI	FS0000000
ANGLE (Deg.)	0		
IMPACT SEVERITY (kJ)	42.5	POST-IMPACT VEHICULAR BEHAVIOR	
EXIT CONDITIONS		MAXIMUM ROLL ANGLE (Deg.)	2.7
SPEED (km/h)	32.76 km/h (20.36 mph)	MAXIMUM PITCH ANGLE (Deg.)	-9.5
ANGLE (Deg.)	90	MAXIMUM YAW ANGLE (Deg.)	1.2

++ AASHTO Designation - M147-65 (1990)