



U.S. Department
of Transportation
Federal Highway

Administration

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

Refer to: HSA-1/WZ-78A

MR. JAN MILLER
EASTERN METAL/USA-SIGN
1430 SULLIVAN STREET
ELMIRA, NY 14901-1698

Dear Mr. Miller:

Thank you for your letters of January 23, April 2, and April 13 and your supplementary facsimile messages of April 23, May 4, and May 8 requesting Federal Highway Administration (FHWA) acceptance of a number of your company's portable sign stands using a variety of rigid sign panels as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letters was a report from SafetyQuest and videos of the crash tests. You requested that we find your company's temporary sign stands 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." This letter supersedes my letter of May 14, 2001, WZ-78.

Introduction

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "INFORMATION: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

A brief description of the devices for which you are requesting acceptance follows:

Request 1

Model E-350 Econo-Stand heavy duty tripod style stand tested with 48x48 hinged ABS sign (EM-23) and with 48x48 0.080 aluminum (EM- 31)

This stand consists of three legs and a mast. The legs are constructed of 32 mm x 32 mm x 2 mm (1.25 in x 1.25 in x 16 ga) cold-formed, galvanized steel tubing conforming to ASTM. A-500 forming a tripod (all steel tubes used in the stands in this series of tests was A-500). A 25 mm x 25 mm x 2 mm (1.0 in x 1.0 in x 16 ga) cold-formed, galvanized steel tube mast attaches to the leg assembly. Two steel clips, one on each leg, and a formed steel bracket attached to the top of

the mast, supporting the sign. Steel flag holders mount to the top sign bracket to support vinyl flags. Three 457 mm (18 in) square vinyl flags on 19 mm x 610 mm (0.8 in x 24.0 in) wooden dowels were placed in the steel holders.

The overall height of the **E-350** stand with flags was 2311 mm (91 in) and 1867 mm (73.5 in) without the flags. The bottom of the sign was 381 mm (15 in) above grade. The total weight of the stand was 7.9 kg (17.5 pounds). The ABS plastic sign was 10.5 kg (23.25 pounds) and the aluminum sign was 8.2 kg (18 pounds.)

Your request is to accept the stand with the following sign substrates:

- 48x48 or smaller center-hinged 6.35 mm (0.250 in) solid ABS plastic signs
- 48x48 or smaller 2.0 mm (0.080 in) aluminum signs
- 48x48 or smaller 2 mm Alusuisse Dibond, Mitsubishi Alpolyc, Reynolds Reynolite or equal Aluminum/LDPE (AL/LDPE) laminated substrate

Request 2

Model X-842 Non-deflecting Interstate Sign Stand tested with 48x48 hinged ABS sign (EM-24 and EM-27)

This “X-footprint” stand consists of four 25 mm x 25 mm x 2 mm (1.0 in x 1.0 in x 16 ga) cold-formed, galvanized steel tubing legs attached to a formed steel base. The stand’s mast consists of 25 mm x 25 mm x 2 mm (1.0 in x 1.0 in x 16 ga) and 21 mm x 21 mm x 1.5 mm (0.81 in x 0.81 in x 16 ga) telescoping galvanized steel tubing and bolts to the base. The rigid plastic sign is attached to the mast tube by one formed steel bracket placed to capture the bottom and a steel rod hook to capture the top point of the sign. Steel flag holders mount to the mast top sign bracket to support vinyl flags. Three 457 mm (18 in) square vinyl flags on 19 mm x 610 mm (0.8 in x 24.0 in) wooden dowels were placed in the steel holders.

The overall height of the **X-842** stand with flags is 2616 mm (103.0 in) and 2121 mm (83.5 in) without flags. The bottom of the sign is 305 mm (12.0 in) above grade. The weight of the stand is 10.9 kg (24 pounds) and the weight of the sign is 21.4 kg (47.25 pounds.)

Your request is to accept the X-842 stand with the following sign substrates:

- 48x48 and smaller center-hinged 6.35 mm (0.250 in) solid ABS plastic signs
- 48x48 or smaller 2.0 mm (0.080 in) aluminum signs
- 48x48 and smaller 2 mm AL/LDPE laminated substrates

Request 3

Model X-880 stand with fiberglass leaf spring tested with a 48x48 Endurance panel.

This “X-footprint” stand consists of four 25 mm x 25 mm x 2.0 mm (1.0 in x 1.0 in x 16 ga) cold-formed, galvanized steel tubing legs attached to a formed steel base. The stand mast, constructed of 32 mm x 32 mm x 2.0 mm (1.25 in x 1.25 in x 16 ga) and 25 mm x 25 mm x 2.0 mm (1.0 in x 1.0 in x 16 ga) telescoping galvanized steel tubing, attaches to a fiberglass leaf spring bolted to the base. The semi-rigid plastic sign is attached to the mast tube by two formed steel brackets placed to capture the bottom and top points of the sign. Steel flag holders mount to the top sign bracket to support vinyl flags. Three 457 mm (18 in) square vinyl flags on 19 mm x 610 mm (0.8 in x 24.0 in) wooden dowels were placed in the steel holders.

The overall height of the model **X-880** stand tested in EM-25 and EM-27 was 2667 mm (105.0 in) with flags and 2108 mm (83.0 in) without flags. The bottom of the sign is 457 mm (18 in) above grade. The total weight of the stand was 13.6 kg (30 pounds) with a sign weighing 5.0 kg (11 pounds.)

Your request is to accept the **X-880** stand with the following sign substrates:

- 48x60, 48x48 and smaller Reflexite Endurance corrugated thermoplastic signs
- 48x60, 48x48 and smaller 2 mm AL/LDPE laminated substrates
- 48x60, 48x48 roll-up signs

Request 4

Model X-552 Mid-size dual vertical coil spring stand tested with 48x48 signs: 0.080 aluminum and 2 mm AL/LDPE laminate sign substrates and 3 wood dowel flags.

The model **X-552** “X-footprint” stand consists of four 25 mm x 25 mm x 2.0 mm (1.0 in x 1.0 in x 16 ga) steel tubing. Coil springs are used to attach the base unit to the steel upright. The stand’s mast consists of 25 mm x 25 mm x 2 mm (1.0 in x 1.0 in x 16 ga) and 21 mm x 21 mm x 1.5 mm (0.81 [or 13/16] in x 0.81 in x 16 ga) telescoping galvanized steel tubing. The rigid sign is attached to the mast tube by two formed steel brackets placed to capture the bottom and top points of the sign. The coil springs are rigidly attached with bolts on either end. Steel flag holders mount to the top sign bracket to support vinyl flags. Three 457 mm (18 in) square vinyl flags on 19 mm x 610 mm (0.8 in x 24.0 in) wooden dowels were placed in the steel holders.

The overall height of the **X-552b** stand is 2896 mm (114 in) with flags and 2388 mm (94 in) without flags. The bottom of the sign is 381 mm (15 in) above grade. The total weight of the stand is 16 kg (35 pounds). The 2 mm AL/LDPE laminate sign weighs 4.8 kg (10.5 pounds) while the 0.080 aluminum sign weighs 8 kg (18 pounds).

The **X-552b** sign stand is identical to the X-552a with the addition of a breakaway hole.

This stand has been accepted for roll-up, Endurance, and 10 mm corrugated plastic signs. (It was tested for use with the Endurance substrate, covered under FHWA acceptance letter WZ-59.)

Your request is to accept the stand with the following sign substrates:

- 48x60, 48x48 or smaller 2.0 mm (0.080 in) aluminum signs
- 48x60, 48x48 or smaller 2 mm AL/LDPE laminated substrate signs

Request 5

Model X-602 High Level Aluminum dual-coil spring Interstate Sign Stand tested with 48x48 0.080 Aluminum and 15 mm (5/8 inch) plywood. mounted at 1524 mm (60 inches), to include 3 wood dowel flags.

The **X-602** is an “X-footprint” stand with two vertically mounted steel coil springs. The four legs are 25 mm x 25 mm x 3.2 mm (1.0 in x 1.0 in x 0.125 in) 6063-T6 extruded aluminum tubing. Coil springs are used to attach the base unit to the 32 mm x 32 mm x 3.2 mm (1.25 in x 1.25 in x 0.125 in) and 25 mm x 25 mm x 3.2 mm (1.0 in x 1.0 in x 0.125 in) telescoping aluminum tube upright. The bottom portion of the upright consists of two pieces of 32 mm x 32 mm x 3.2 mm

aluminum tubing. A breakaway sleeve, consisting of 33 mm x 33 mm x 229 mm (1.3 in x 1.3 in x 9 in) aluminum, connects the two portions of the lower upright together at approximately 460 mm (18 inches) above grade. The sign is attached to the mast tube by two formed steel brackets placed to hold the bottom and top points of the sign. The coil springs are rigidly attached with bolts on either end. Steel flag holders mount to the top sign bracket to support vinyl flags. Three 457 mm (18 in) square vinyl flags on 19 mm x 610 mm (0.8 in x 24.0 in) wooden dowels were placed in the steel holders.

The overall height of the **X-602** stand is 3962 mm (156 in) with flags and 3454 mm (136 in) without flags. The bottom of the sign is 1524 mm (60 in) above grade. The total weight of the stand is 23.6 kg (52 pounds). The 2 mm (0.08 in) thick aluminum sign weighs 8 kg (18 pounds) while the 16 mm (5/8 inch) plywood sign weighs 13 kg (29 pounds) forming a combined stand/sign weight of 32 kg (70 pounds) and 37 kg (81 pounds) respectively.

Your request is to accept the stand with the following sign substrates:

- 48x60, 48x48 or smaller center-hinged 6.35 mm (0.250 in) solid ABS plastic signs
- 48x60, 48x48 or smaller 2.0 mm (0.080 in) aluminum signs
- 48x60, 48x48 or smaller 2 mm AL/LDPE laminate
- 48x60, 48x48 or smaller 0.080 aluminum
- 48x60, 48x48 or smaller 16 mm (5/8 inch) plywood

Testing

Full-scale automobile testing was conducted on your company's devices. Two stand-alone examples of the device were tested in tandem, one head-on and the next placed six meters downstream turned at 90 degrees, as called for in our guidance memoranda. A summary of the crash testing is shown in Enclosure 1. The complete devices tested are shown in the Enclosure 2.

Findings

Damage during the testing varied from no windshield contact, to major damage. Those systems that caused unacceptable damage were redesigned and retested, yielding acceptable results. The results of the testing met the FHWA requirements. We concur that the test or tests conducted on each stand encompass the "worst case" substrates and that the lighter or more flexible substrates you have requested are not likely to cause more damage than the tested signs, 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. Where a sign has been modified during testing (and yielded better results) the modified design is the acceptable version. In summary, these are the sign stands found acceptable by this action:

- 1) **Model E-350 Econo-Stand** heavy duty tripod style stand with the following signs:
 - 48x48 or smaller center-hinged 6.35 mm (0.250 in) solid ABS plastic signs
 - 48x48 or smaller 2.0 mm (0.080 in) aluminum signs
 - 48x48 or smaller 2 mm Alusuisse Dibond, Mitsubishi Alpolic, Reynolds Reynolite or equal AL/LDPE laminated substrate
- 2) **Model X-842 Modified Non-deflecting Interstate Sign Stand** with the following signs:
 - 48x48 and smaller center-hinged 6.35 mm (0.250 in) solid ABS plastic signs
 - 48 x 48 or smaller 2.0 mm (0.080 in) aluminum signs
 - 48x48 and smaller 2 mm AL/LDPE laminated substrates.

- 3) **Model X-880 Modified stand with fiberglass leaf spring** with the following signs:
48x60, 48x48 and smaller Reflexite Endurance corrugated thermoplastic signs
48x60, 48x48 and smaller 2 mm AL/LDPE laminated substrates
48x60, 48x48 roll-up signs
- 4) **Model X-552 Mid-size dual vertical coil spring stand** with the following signs:
48x60, 48x48 or smaller 2.0 mm (0.080 in) aluminum signs
48x60, 48x48 or smaller 2 mm AL/LDPE laminated substrate signs
- 5) **Model X-602 High Level Aluminum dual-coil spring Interstate Sign Stand** with the following signs:
48x60, 48x48 or smaller center-hinged 6.35 mm (0.250 in) solid ABS plastic signs
48x60, 48x48 or smaller 2.0 mm (0.080 in) aluminum signs
48x60, 48x48 or smaller 2 mm AL/LDPE laminate
48x60, 48x48 or smaller 0.080 aluminum
48x60, 48x48 or smaller 16 mm (5/8 in) plywood

Mounting heights

The vertical position of the sign mounted on the stand is usually a critical factor in the crashworthiness of the device. Stands tested with the sign mounted low to the ground, i.e., 457 mm (18 in) or less should not have signs placed on them at higher elevations. Signs tested on high mast supports at 1524 mm (60 in) may be mounted higher, but not lower. When using signs other than the 48x48 diamonds tested, the location of the top of the sign must be considered. For low stands, the top of the sign should be at or below the height of the tested signs. For tall stands, the height should be at or above that of the tested sign.

Aluminum Laminate Substrates

Through crash testing and comparison of external properties we have concluded that the following 2 mm thick aluminum laminate substrates will be considered equally acceptable for use on a portable/temporary sign stand that has been crash tested or otherwise found acceptable with any of the three brands. Alusuisse Dibond, Mitsubishi Alpolic, Reynolds Reynolite

Roll up Signs

Not all roll-ups signs are interchangeable for crashworthiness purposes. The width of the fiberglass ribs or “spreaders” is usually consistent at 31.75 mm (1.25 in) but the thickness may vary. Horizontal ribs of 4.75 mm (3/16 in) are acceptable as crashworthy. Your company has tested certain stands with “Rigid Roll Up” signs having thicker horizontal ribs. These thicker ribbed signs should be restricted to the specific stands on which they were tested or with 0.080 in aluminum or heavier substrate signs.

Please note the following standard provisions which apply to 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 FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-78A shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- Eastern Metal/USA Signs stand may include patented components and if so are considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are selected by the contractor for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are specified for use on Federal-aid projects, except exempt, non-NHS 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.

Sincerely yours,

Frederick G. Wright, Jr.
Program Manager, Safety

6 Enclosures

The crash tests are summarized in the table below:

Test Number	EM-23	EM-24	EM-25	EM-27	EM-27	EM-30	EM31 **	EM-32	EM-35	EM-36 **
Test Article	E-350	X-842*	X-880*	X-880 Modified	X-842 Modified	X-602	E-350	X-602	X-550 (X-552)	X-550 (X-552)
Substrate	ABS	ABS	Endurance	Endurance	ABS	080 solid Al	080 solid Al	5/8" plywood	080 solid Al	2 mm AL/LDPE
Height to Sign Bottom	381 mm	305 mm	457 mm	457 mm	457 mm	1524 mm	381 mm	1524 mm	381 mm	381 mm
Height to Top of Sign	1867 mm	2121 mm	2108 mm	2121 mm	2108 mm	3454 mm	1867 mm	3454 mm	2388 mm	2388 mm
Flags or lights	3 flags	3 flags	3 flags	3 flags	3 flags	3 flags	3 flags	3 flags	3 flags	3 flags
Test Article Mass	18.4 kg	32.3 kg	18.6 kg	32.3 kg	18.6 kg	32 kg		37 kg	24 kg	24 kg
Vehicle Inertial Mass	802 kg	802 kg	802 kg	802 kg	802 kg	802 kg	802 kg	802 kg	802 kg	802 kg
Impact Speed, Head-on	98.8 km/hr	100.6 km/hr	96.1 km/hr	100.4 km/h		96 km/h	100.1 km/hr	100 km/hr	100 km/hr	99.6 km/hr
Vehicle crush	Dents	Big dents	Dents	Dents and scratches		Dents, scratches	Dents	Dents	Dents, scrapes	Dents, Scrapes
Occupant Compartment Intrusion	None	Yes, during head on impact	Yes, during 90 degree hit	None	None	None	None	None	None	None
Windshield Damage	Cracked, broken	Destroyed, penetrated	Cracked, Penetrated	No contact	Deflected glass 38 mm	None	Contact, but no damage	No impacts	Significant damage but no hole	Significant local damage but no hole

* In tests EM-24 and EM-24 the X-842 and X-880 stands caused unacceptable damage in the Head-On and 90 degree tests, respectively. Modifications were made to each stand. The two Modified stands were tested in EM-27, producing acceptable results. The modifications, which will be incorporated in to all subsequent examples of these models will improve performance under all impact directions.

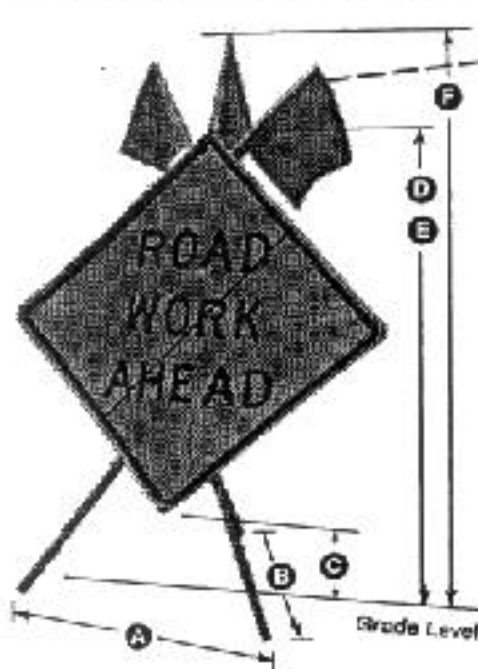
** These tests were to qualify previously tested stands with additional substrates.

Product Specification Sheet



E-350 Sign Stand

Description: Eastern **Metal/USA-SIGN E-350** Econo Stand, Tripod Style Sign Stand with a 48" center-hinged, diamond shaped, 1/4" thick ABS Plastic Sign Panel and 3 wooden dowel flags inserted into a permanently attached flag holder.



FROV-118/24" 18" Square fluorescent vinyl flags on 24" x 3/4" wooden staffs.
Individual Flag Weight: 0.4 lbs

48" Center-Hinged, Diamond Shaped, ABS Sign Panel*:

Sign: Two- 24" x 48" x 1/4" ABS Panels joined with two steel hinges, forming a folding sign (48" x 48" to 24" x 48") for easy storage and sheeting protection. The sign is held on the stand by a rigid sign holder permanently mounted to the sign stand mast and two sign holders mounted on the front legs. Total Weight 23.25 lbs.

36" Center-Hinged, Diamond Shaped, ABS Sign Panel:

Sign: Two- 18" x 36" x .160" ABS Panels joined with two steel hinges, forming a folding sign (36" x 36" to 18" x 36") for easy storage and sheeting protection. The sign is held on the stand by a rigid sign holder permanently mounted to the sign stand mast and two sign holders mounted on the front legs. Total Weight 13.75 lbs.

Additional Signs:

48" Diamond Shaped, .080" Aluminum (16 sf) Rigid Sign*
Total Weight 18.2lbs.

36" Diamond Shaped, .080" Aluminum (9 sf) Rigid Sign
Total Weight 10.24 lbs.

Model Number	Description	Weight	Fully Extended Foot Print		Height Above Grade Level			
			Width A	Depth B	Bottom of Sign C	Top of Mast D	Top of Sign E	Top of Flag F
E-350*	Series Standard Steel Tripod Stand for Rigid Signs	17.5 lbs	48"	47-1/2"	15"	73-1/2"	73"	91"

Stand Material/Construction Features:

Stand Tubing: 16 ga. Cold-formed galvanized 1-1/4", and 1" tubing ASTM-A500 Rated Steel.

* Tested Product/Model

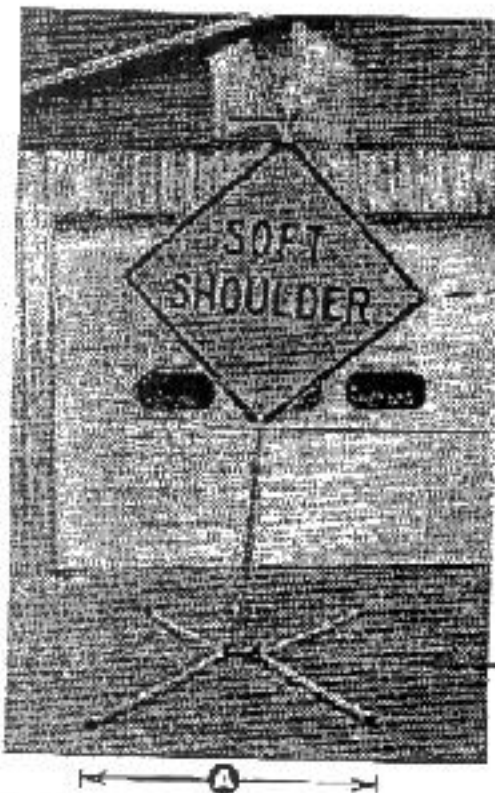
Product Specification Sheet



X-600 Series Sign Stand ('01 Model Modifications)

Description:

Eastern Metal/USA-SIGN® Model X-602 Hi-Level Aluminum, dual vertical spring stand with 2001 modifications. Tested with a 48" Diamond .080" Aluminum Sign and a 5/8" Plywood Sign, flag holder with 3 wood dowel flags.



FROV-118/24:

18" Square fluorescent vinyl flags on 24" x 3/4" wooden staffs
Individual Flag Weight: 0.4 lbs

X-602 with a Rigid Sign

Material/Construction Features:

Signs 48" Diamond .080" Aluminum Sign or 48" Diamond 5/8" Plywood Sign each with high visibility retroreflective sheeting. The sign is held on the stand by two rigid sign holders permanently mounted to the sign stand, no other hardware is mounted to the sign.

48-DIAx080-EG/AL* Aluminum Sign, (16 s.f.)
Total Weight 18.0 lbs

36-DIAx080-EG/AL Aluminum Sign, (9 s.f.)
Total Weight 10.2 lbs

48-DIAx5/8-EG/PLY* Plywood Sign, (16 s.f.)
Total Weight 29.0 lbs

36 DIAx5/8-EG/PLY Plywood Sign, (9 s.f.)
Total Weight 16.5lbs

Model Number Description

Weight	Foot Print Width (A)	Foot Print Depth (B)	Bottom of Sign (C)	Top of Mast (D)	Top of Sign (E)	Top of Flag (F)
45.0 lbs	52"	121.5"	60"	136"	126"	156"

X-602* Large Interstate Dual Coil Spring Steel Sign Stand with two steel Rigid Sign brackets on mast.

Stand Material/Construction Features:

Stand Tubing: .100" Wall thickness x 1-1/2" and 1-1/4" 6061-T6 Extruded Aluminum

Spring System: 2 Vertical heavy coil steel springs mounted to base and mast with bolt/lock washer set threading into custom composite cast "plug" turned into spring.

Base, Sign Bracket(s), Flag Holder, Connecting Brackets: Formed/Fabricated Steel with powder coated, galvanized or anodized finish.

2001 Model Modification Details:

Welded spring mounting channel plate on base assembly lowered 2".

Mast tubing cut at 18" above grade to facilitate the insertion of a patent-pending custom cast composite frangible channel assembly with 2 through-bolt attachments to top and bottom section of lower mast. (see attached confidential drawing)

All 6061-T6 aluminum alloy tubing, wall thickness reduced from .125" to .100"

Leg and upper mast 1-1/4" o.d. with lower mast 1-1/2" o.d.

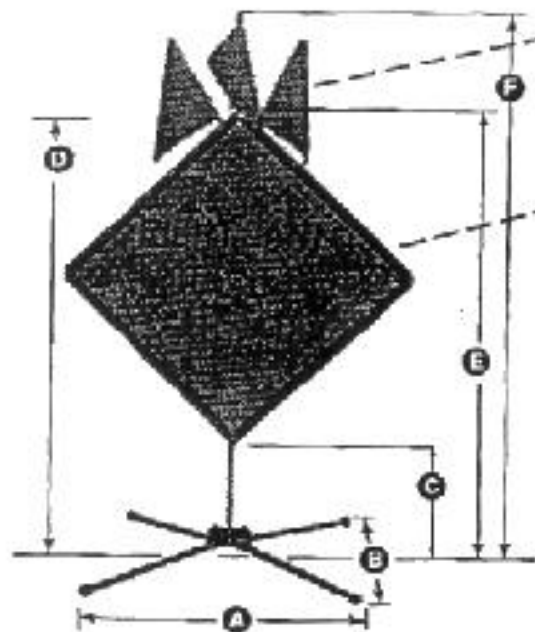
* Tested Product

Product Specification Sheet



X-840 Series Sign Stand (Model X-842)

Description: Eastern **Metal/USA-SIGN X-842** non-deflecting Interstate Series™ Sign Stands with a 48" center-hinged, diamond shaped, 1/4" thick ABS Plastic Sign Panel mounted with two attachment brackets and 3 wooden dowel flags inserted into a permanently attached flag holder.



PROV-118/24* 18" Square fluorescent vinyl flags on 24" x 3/4" wooden staffs.
Individual Flag Weight: 0.4 lbs

48" Center-Hinged, Diamond Shaped, ABS Sign Panel*:
Sign: Two- 24" x 48" x 1/4" ABS Panels joined with two steel hinges, forming a folding sign (48" x 48" to 24" x 48") for easy storage and sheeting protection. The sign is held on the stand by rigid sign holders permanently mounted to the sign stand and a steel carrying handle which fits behind the mast. Total Weight: 23.25 lbs

36" Center-Hinged, Diamond Shaped, ABS Sign Panel*:
Sign: Two- 18" x 36" x 1/16" ABS Panels joined with two steel hinges, forming a folding sign (36" x 36" to 18" x 36") for easy storage and sheeting protection. The sign is held on the stand by rigid sign holders permanently mounted to the sign stand and a steel carrying handle which fits behind the mast. Total Weight: 13.75 lbs

Model Number	Test/Description	Weight	Fully Extended Foot Print		Height Above Grade Level			
			Width (A)	Depth (B)	Bottom of Sign (C)	Top of Mast (D)	Top of Sign (E)	Top of Flag (F)
X-842	Test #24 at 90°	24.0 lbs	66"	79"	12"	91-1/2"	77-1/2"	106"
Standard Model with extended 1" and 13/16" Mast, two steel rigid sign brackets and 4, 1-piece 1" Square Legs.								
X-842HD*	Test #27 at 0°	25.5 lbs	66"	79"	12"	91-1/2"	77-1/2"	106"
Same as X-842 with additional mast reinforcement of nested 1-1/4" tubing section over 1" lower mast tubing and sign attachment hook set-up fixed at mast top. (Drawing Attached)								

Stand Material/Construction Features:

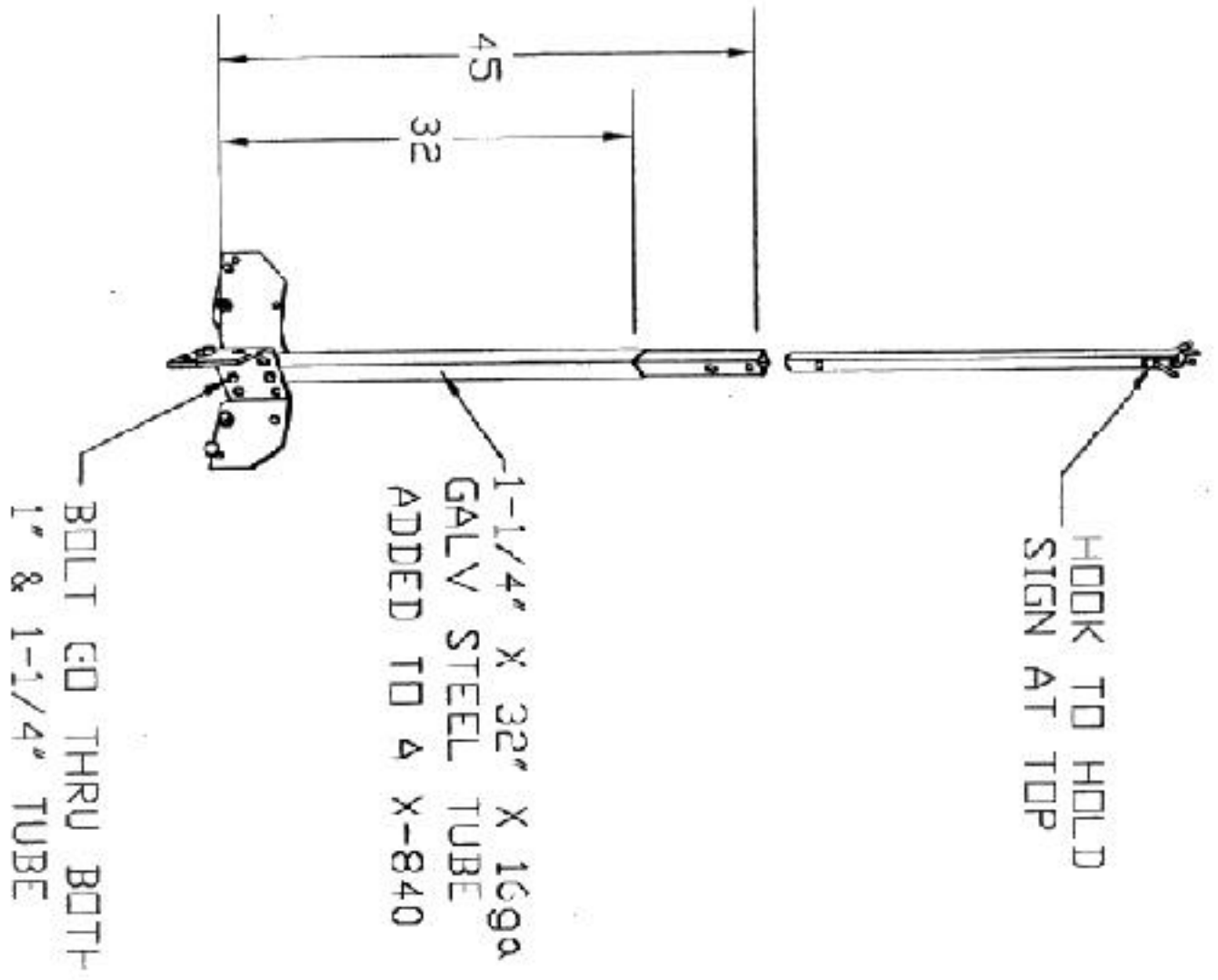
Stand Tubing: 16 ga. Cold-formed galvanized 1", and 13/16" square ASTM-A500 Rated Steel Tubing. X-842HD

includes all of above plus an addition section of 1-1/4" square ASTM-A500 Rated Steel Tubing.

Wind-deflection: Non-deflecting mast, wind-deflection achieved from roll-up sign.

Base, Sign Bracket(s), Flag Holder, Connecting Brackets: Formed/Fabricated Steel with a powder coated, galvanized or anodized finish.

* Product for which acceptance is requested.



HOOK TO HOLD
SIGN AT TOP

1-1/4" X 32" X 16ga
GALV STEEL TUBE
ADDED TO Δ X-840

BOLT GO THRU BOTH
1" & 1-1/4" TUBE

NO	DATE	REVISIONS	BY
EASTERN METAL OF ELMIRA, INC. ELMIRA, N.Y.			
DATE: 19 JAN 92		DESIGNED BY: GABE	DATE: 05 DEC 00
X-840 HD		DRAWN BY:	

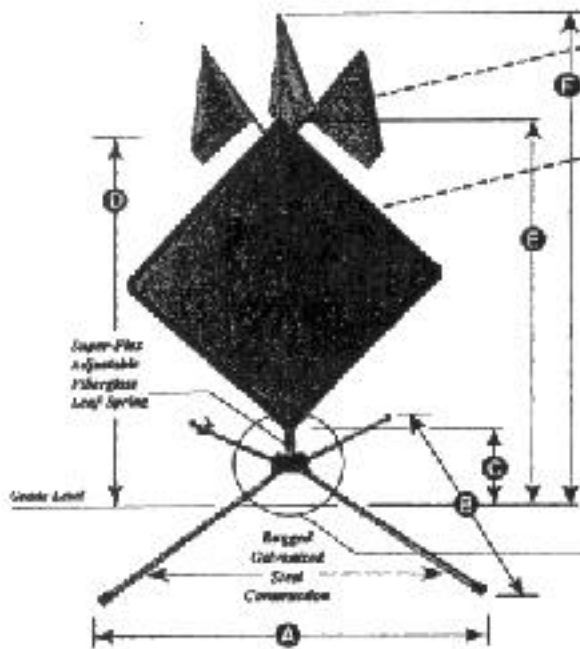
Product Specification Sheet



X-880 Sign Stand

Description:

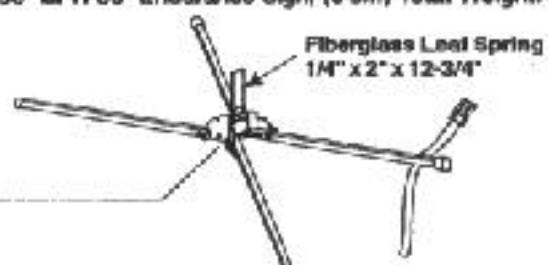
Eastern Metal/USA-SIGN X-880 Interstate™ Sign Stand with Fiberglass Leaf Spring. Reflexite Endurance® 48" Diamond Sign Wind Deflecting panel mounted to attachment brackets and 3 wood dowel flags inserted into permanently attached flag holders.



FROV-118/24" 18" Square fluorescent vinyl flags on 24" x 3/4" wooden staffs.
Individual Flag Weight: 0.4 lbs

X-880 Sign Stand Features
Sign: Reflexite Endurance® High Performance thermoplastic sign with high visibility retroreflective fluorescent sheeting. The sign is mounted to stand by two formed 5/16" steel rod lower supports and slip over top of formed steel "V" bracket.

48" EFR-48" Endurance Sign, (16 s.f.) Total Weight: 11.0 lbs
36" EFR-36" Endurance Sign, (9 s.f.) Total Weight: 9.2 lbs



Model Number	Test/Description	Weight	Fully Extended Foot Print				Height Above Grade Level		
			Width (A)	Depth (B)	Bottom of Sign (C)	Top of Mast (D)	Top of Sign (E)	Top of Flag (F)	
X-880	Test 25: Standard Model with 16" long x 2" wide x 5/16" thick Fiberglass Leaf Spring	30 lbs	55"	93"	16"	83"	83"	105"	
Modified X-880*	Test 27: Modified Fiberglass Leaf Spring 12-3/4" long x 2" wide x 1/4" thick	30 lbs	55"	93"	16"	83"	83"	105"	

Stand Material/Construction Features:

Stand Tubing: 1-1/4", 1" and 13/16" 16 ga. Cold-formed galvanized ASTM-A500 Rated Square Steel Tubing

Wind Deflection: Wind Deflection accomplished with custom pultruded Fiberglass Leaf Spring

X-880 Product Modification s for acceptable result will require use at lighter duty 12-3/4" long x 2" wide x 1/4" thick Leaf Springs.

Base, Sign Bracket(s) and Flag Holder: Formed Steel plate sheet, rod and round tubing with powder coating or zinc plated finish.

*Product for which acceptance is requested