



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

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

Refer to: HSA-1\WZ-68

DAVID STROUDT  
GENERAL MANAGER  
SIGN UP CORPORATION  
P O BOX 14624  
PORTLAND, OR 97293

Dear Mr. Stroudt:

Thank you for your letter of December 1, 2000, requesting Federal Highway Administration (FHWA) acceptance of your company's **Model 27-SSX** Portable Sign Stand as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter was a report from E-Tech Testing Services and a video of the crash test. You requested that we find your company's temporary sign stand 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**

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:

The **Model 27-SSX** is a lightweight portable sign system featuring a rigid (unsprung) upright support. The sign is available with one piece legs or telescoping legs. The telescoping leg was selected as the "worst case" configuration for testing. The legs are made of 19.05 mm square x 1.52 mm wall tubing that telescopes inside a 25.4 mm x 2.03 mm wall tubing. The legs extend from 686 mm to 1016 mm. The material specification is ASTM A500/A513 for all ERW steel square tubing used in the support. Each leg is attached to a "base plate" assembly with a 9.53 mm diameter Grade 5 hex bolt with locking nut. There are slots in the base plate that allow each leg to be adjusted for uneven terrain. The base plate is composed of 4.75 mm thick formed ASTM A36 cold rolled steel "side" and "collapsible" plates. To form the assembly, the side plates are bolted to the collapsible plates with two 9.53 mm diameter Grade 5 bolts with locking nuts. The base plate

assembly in turn supports a sign mounting stem “socket” made from 25.4 mm x 2.03 mm wall steel tube. A 1067 mm long x 19.05 mm square x 1.52 mm wall steel tubing “mast” is locked to the stem by 9.53 mm diameter spring detent pin. A flag holder, made of two 20 gage steel plates formed and spot welded together, completes the top of the mast. The sign support was equipped with a 1218 mm vinyl roll-up sign secured by “Fiber-Flex” fiberglass vertical braces. Three 457 mm square vinyl flags with wooden dowels were attached to the top of the support.

You also requested acceptance for two variations of this stand. **Model 38-SSB** is identical except that the 1016 mm long legs are one piece instead of telescoping. **Model 48-SSB** is identical except that the legs are one piece and are 1220 mm long.

### 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. The complete devices as tested are shown in the Enclosure 1.

The crash test is summarized in the table below:

Test Number	18-5772-01
Test Article	Sign Up X-based stand Model 27-SSX
Height to Bottom of Sign	737 mm (29 inches)
Height to Top of Sign	2460 mm (97 inches)
Flags or lights	3 vinyl flags on wood dowels
Test Article Mass (each)	14.1 kg (31 pounds)
Vehicle Inertial Mass	830 kg (1830 pounds)
Impact Speed, Head-on	101.8 km/h (63.25 mph)
Impact Speed, 90 Deg.	99.0 km/h (61.5 mph)
Velocity Change, Head-on**	2.8 km/h or 0.78 m/sec (2.56 f/s)
Velocity Change, 90 deg.**	2.8 km/h or 0.78 m/sec (2.56 f/s)
Vehicle crush	Slight damage to bumper and hood
Occupant Compart. Intrusion	None
Windshield Damage	None

\*\*The velocity change recorded for the head-on hit is the difference between the impact speed of the vehicle into the first stand and then into the second. The velocity change for the 90 degree hit was recorded as 96.2 km/h)

### Findings

The damage was limited to scrapes and dents to the bumper and hood. There was no damage to the windshield. The results of test met the FHWA requirements and, therefore, the Sign-Up **Model 27-SSX** portable sign stand described above and shown in the enclosed drawings for

reference is acceptable for use as a Test Level 3 device on the NHS under the range of conditions tested, when proposed by a State. Because the legs did not telescope or fracture during the test, **Model 38-SSB and Model 48-SSB** sign stand are also considered acceptable for use. The drawings of these two stands are also enclosed for reference.

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-68 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.
- Sign-Up sign stands 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

2 Enclosures



C. Illustrations

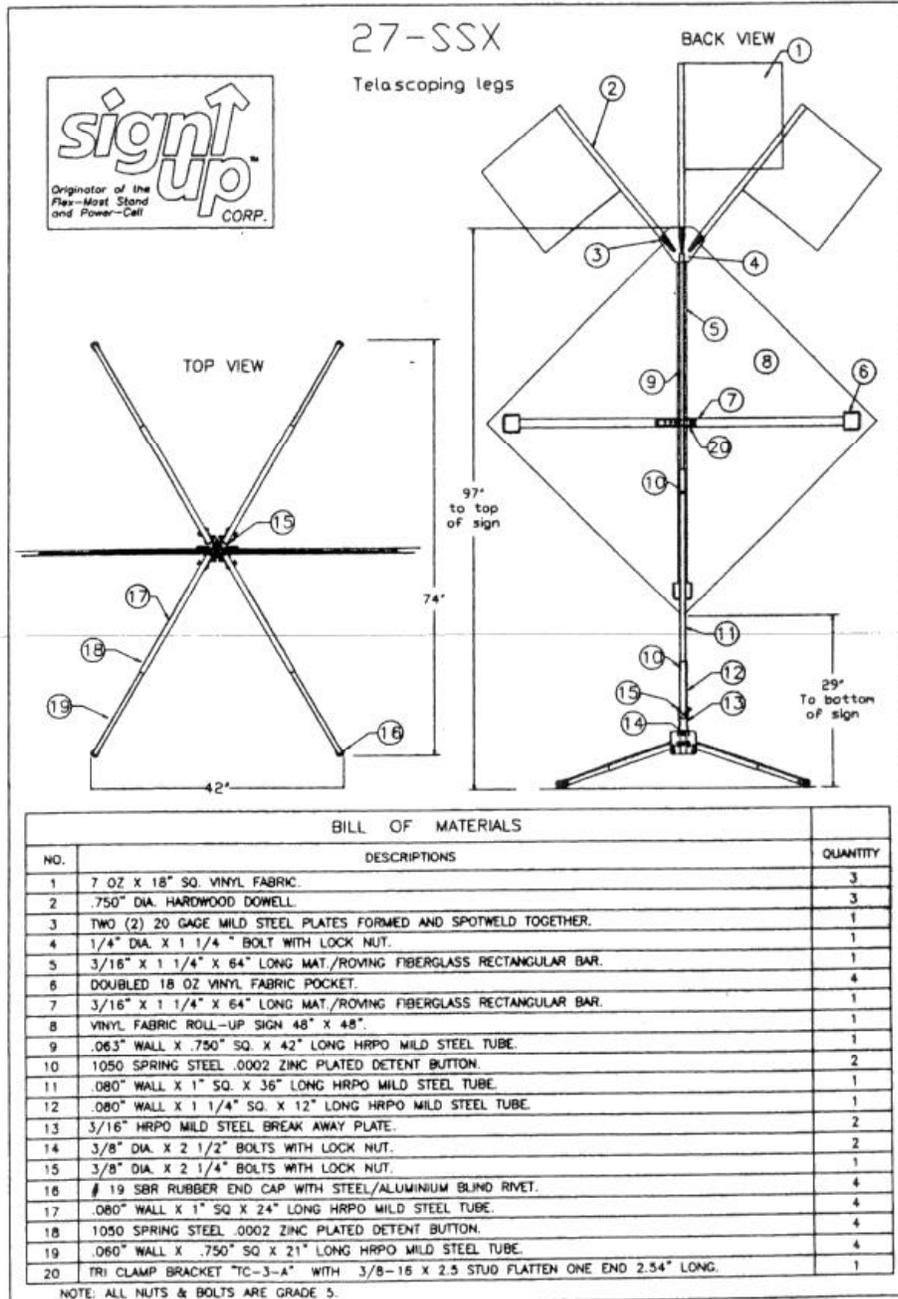
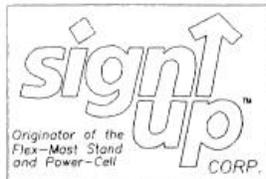


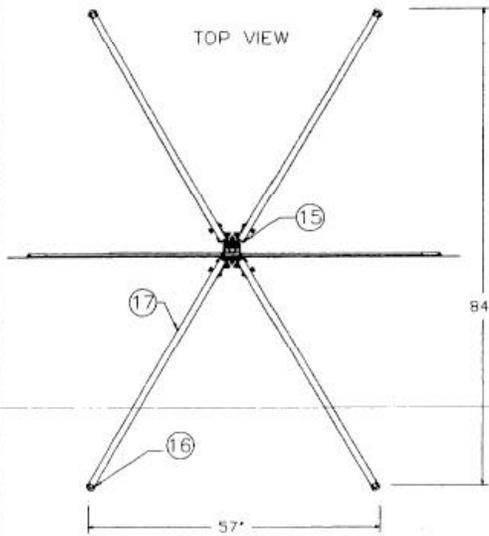
Illustration C-1. Sign Up Corporation - 27-SSX Portable Sign (1 of 2)



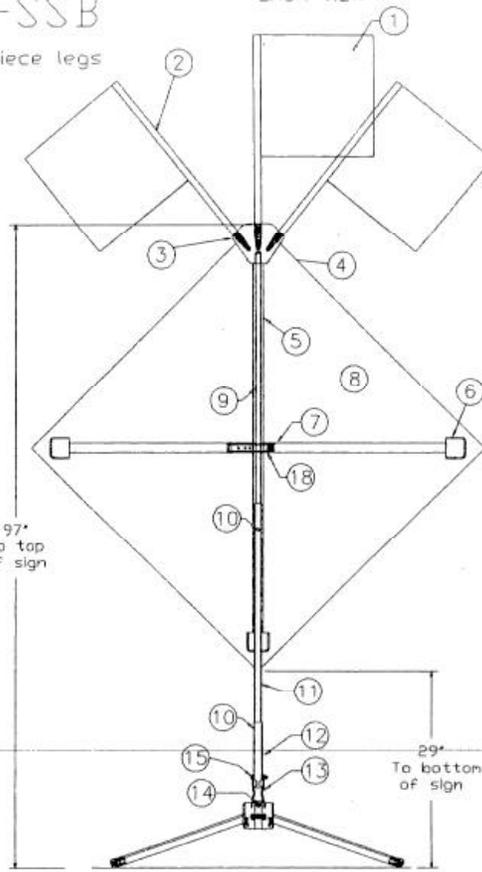
# 48-SSB

One piece legs

BACK VIEW



97" to top of sign



## BILL OF MATERIALS

NO.	DESCRIPTIONS	QUANTITY
1	7 OZ X 18" SQ. VINYL FABRIC.	3
2	.750" DIA. HARDWOOD DOWELL.	3
3	TWO (2) 20 GAGE MILD STEEL PLATES FORMED AND SPOTWELD TOGETHER.	1
4	1/4" DIA. X 1 1/4" BOLT WITH LOCK NUT.	1
5	3/16" X 1 1/4" X 64" LONG MAT./ROVING FIBERGLASS RECTANGULAR BAR.	1
6	DOUBLED 18 OZ VINYL FABRIC POCKET.	4
7	3/16" X 1 1/4" X 64" LONG MAT./ROVING FIBERGLASS RECTANGULAR BAR.	1
8	VINYL FABRIC ROLL-UP SIGN 48" X 48".	1
9	.063" WALL X .750" SQ. X 42" LONG HRPO MILD STEEL TUBE.	1
10	1050 SPRING STEEL .0002 ZINC PLATED DETENT BUTTON.	2
11	.080" WALL X 1" SQ. X 36" LONG HRPO MILD STEEL TUBE.	1
12	.080" WALL X 1 1/4" SQ. X 12" LONG HRPO MILD STEEL TUBE.	1
13	3/16" HRPO MILD STEEL BREAK AWAY PLATE.	2
14	3/8" DIA. X 2 1/2" BOLTS WITH LOCK NUT.	2
15	3/8" DIA. X 2 1/4" BOLTS WITH LOCK NUT.	1
16	# 19 SBR RUBBER END CAP WITH STEEL/ALUMINIUM BLIND RVET.	4
17	.080" WALL X 1" SQ X 48" LONG HRPO MILD STEEL TUBE.	4
18	TRI CLAMP BRACKET "TC-3-A" WITH 3/8-16 X 2.5 STUD FLATTEN ONE END 2.54" LONG.	1

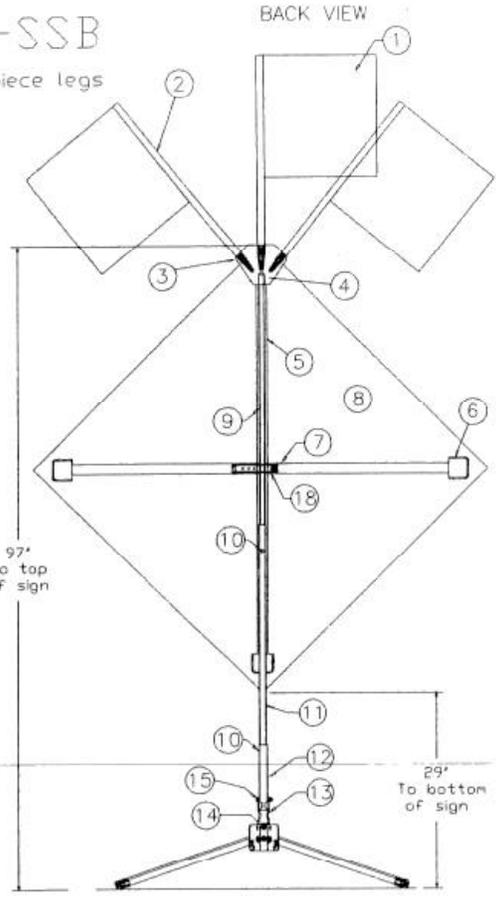
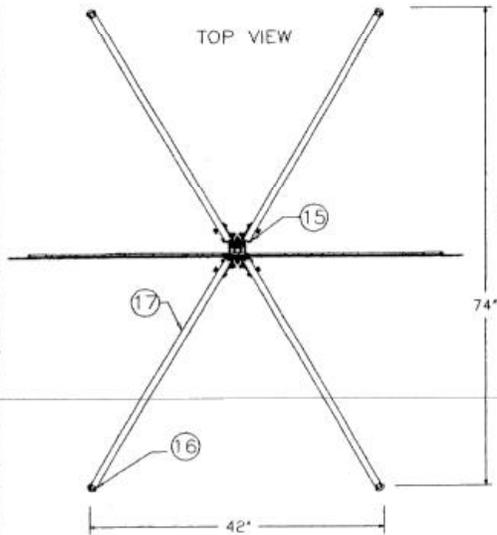
NOTE: ALL NUTS & BOLTS ARE GRADE 5.



# 38-SSB

One piece legs

BACK VIEW



## BILL OF MATERIALS

NO.	DESCRIPTIONS	QUANTITY
1	7 OZ X 18" SQ. VINYL FABRIC.	3
2	.750" DIA. HARDWOOD DOWELL.	3
3	TWO (2) 20 GAGE MILD STEEL PLATES FORMED AND SPOTWELD TOGETHER.	1
4	1/4" DIA. X 1 1/4" BOLT WITH LOCK NUT.	1
5	3/16" X 1 1/4" X 64" LONG MAT./ROVING FIBERGLASS RECTANGULAR BAR.	1
6	DOUBLED 18 OZ VINYL FABRIC POCKET.	4
7	3/16" X 1 1/4" X 64" LONG MAT./ROVING FIBERGLASS RECTANGULAR BAR.	1
8	VINYL FABRIC ROLL-UP SIGN 48" X 48".	1
9	.063" WALL X .750" SQ. X 42" LONG HRPO MILD STEEL TUBE.	1
10	1050 SPRING STEEL .0002 ZINC PLATED DETENT BUTTON.	2
11	.080" WALL X 1" SQ. X 36" LONG HRPO MILD STEEL TUBE.	1
12	.080" WALL X 1 1/4" SQ. X 12" LONG HRPO MILD STEEL TUBE.	1
13	3/16" HRPO MILD STEEL BREAK AWAY PLATE.	2
14	3/8" DIA. X 2 1/2" BOLTS WITH LOCK NUT.	2
15	3/8" DIA. X 2 1/4" BOLTS WITH LOCK NUT.	1
16	# 19 SBR RUBBER END CAP WITH STEEL/ALUMINIUM BLIND RIVET.	4
17	.080" WALL X 1" SQ X 40" LONG HRPO MILD STEEL TUBE.	4
18	TRI CLAMP BRACKET "TC-3-A" WITH 3/8-16 X 2.5 STUD FLATTEN ONE END 2.54" LONG.	1

NOTE: ALL NUTS & BOLTS ARE GRADE 5.

Sec. 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.

ENCLOSURE 2