

WZ-21



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

September 27, 1999

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

Refer to: HMHS

Mr. W.M. ~~Koran~~
President
Korman Signs Inc.
3029 Lincoln Avenue
Richmond, VA 23228-4295

Dear Mr. Korman:

Thank you for your letters of August 10 and August 12, 1999, requesting Federal Highway Administration (FHWA) acceptance of your company's compact portable "x-footprint" sign stands, Models SS548UCA and SS548UCRA, as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter were copies of the crash test reports by General Testing Laboratories, color photographs, and video documentation of the crash tests. You requested that we find the tested devices acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

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, 1999, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This recent memorandum lists devices that are acceptable under Categories I, II, and III.

Full-scale automobile testing was conducted on your company's portable sign supports. Both supports consist of aluminum legs and a short steel upright. A vertical fiberglass brace supports the sign itself and a horizontal fiberglass spreader holds out the corners of the sign. In Model SS548UCRA, the connection between the aluminum legs and the steel upright is rigid (hence the "R" in the model number.) In Model SS548UCA the upright is supported by a spring connection. In all tests the stands supported a 1220-mm square rollup warning sign. Drawings of the tested stands are enclosed. Two examples of each device were tested in tandem, one head-on and the next at 90 degrees, as called for in our guidance memoranda. A summary of the crash testing is shown in the following table:

Test Article	SS548UCRA	SS548UCA
Height of Mast	584 mm	813 mm
Height to Top of Sign	2040 mm	2210 mm
Height to Bottom of Sign	343 mm	533 mm
Length of Legs	1294 mm	1294 mm
Method of Attaching Sign	Hand-turned wheel	Clamp actuating lever
Flags or lights	none	none
Test Article Mass (w/o sign)	7.3 kg	11.14 kg
Vehicle Inertial Mass	810 kg	776 kg
Speed (Radar Gun)	97 km/h	101 km/h
Occupant Impact Speed	none	none
Vehicle crush	minor dents to bumper and hood	minor dents to bumper, hood and door frame; grille cracked
Occupant Compart. Intrusion	none	none
Windshield Damage Head-on	cracking in middle	no damage
Windshield Damage 90 Deg.	cracking in upper right center	no damage

During the tests the most extensive windshield damage was cracking and slight deformation in the immediate vicinity of the impact. There was no occupant compartment intrusion observed, nor did any test article debris show potential for penetrating the occupant compartment. The cracking was not extensive enough to impair the ability of the driver to steer the vehicle. The results of this testing met the FHWA requirements and, therefore, the devices listed above and illustrated in Enclosure 1 are acceptable for use on the NHS under the range of conditions tested, when proposed by a State.

In your second letter you asked about other portable sign stands that your company makes. You requested that Model Numbers SS548UCR and SS548UC be considered acceptable. These stands are essentially the same as the two tested stands except that the legs are steel instead of aluminum. The primary difference between the aluminum and steel-legged signs is the weight. The performance of the steel-legged signs is expected to be comparable to the tested aluminum-legged signs. We concur that these stands using steel legs will be acceptable.

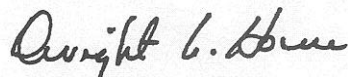
You also noted that the method of securing the vertical fiberglass mast to the short steel upright can vary. The test of SS548UCRA used a "hand wheel" clamping mechanism that can hold the fiberglass mast firmly, preventing it from pulling out during an impact. In the test of SS548UCA a "clamp actuating lever" was used that limited the amount of force holding the sign to the base. It is desirable that the sign and its fiberglass frame (upright and horizontal spreader) disengage from the stand rather than being slammed down on the hood or windshield of the car. Therefore, either clamping technique will be an acceptable alternate on stands that have been successfully crash tested.

The following conditions apply to the portable sign stands described and accepted in this letter:

- Sign panel must be plastic/fabric "roll-up" type material
- Vertical support above base mast is 9.5-mm thick (3/8-inch) fiberglass
- Horizontal brace is 4.8-mm thick (3/16-inch) fiberglass
- No metal mast may be used to support the sign (above the base assembly)

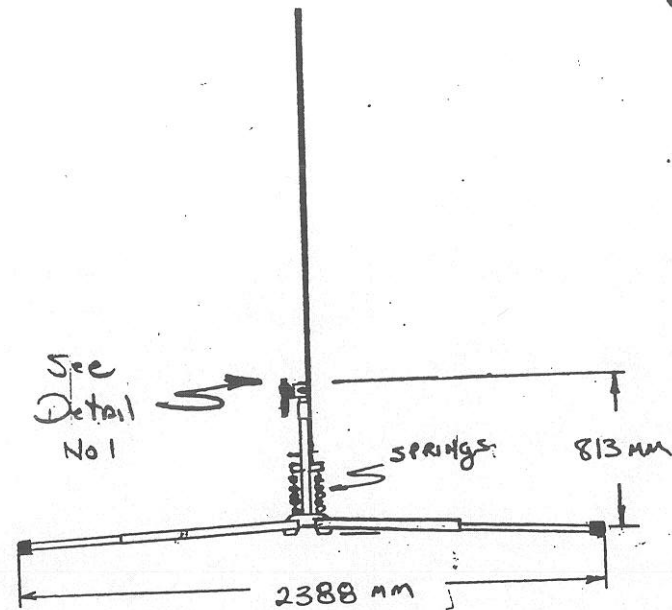
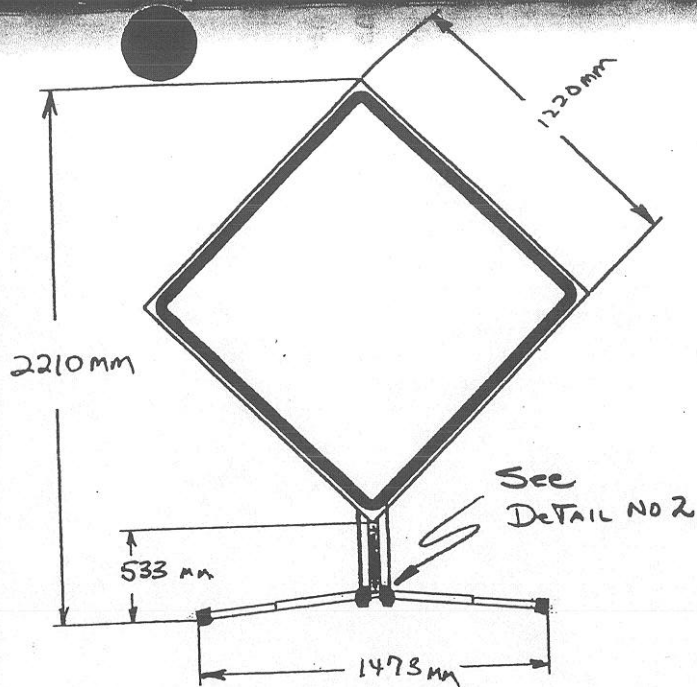
Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices. Presumably, you will supply potential users with sufficient information on design and installation requirements to ensure proper performance. We anticipate that the States will require certification from Korman Signs that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as those submitted for acceptance. To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-21, shall not be reproduced except in full.

Sincerely yours,



Dwight A. Home
Director, Office of Highway Safety In&structure

2 Enclosures




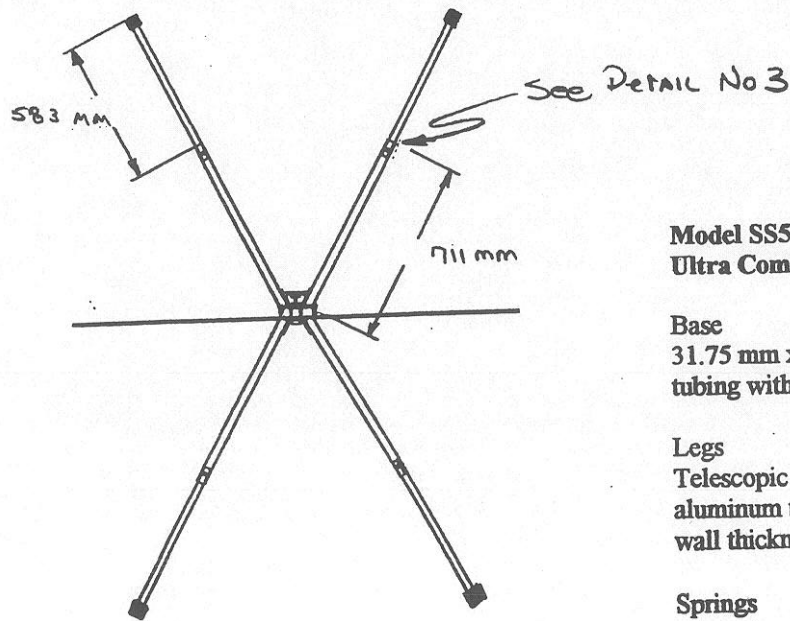
Model 4848DFUC
Roll Up Sign

Fabric
3M Diamond Grade Reflective Roll up Sign Sheeting
#RS-24

Crossbraces(Ribs)
Vertical 9.53mm thick, 31.75mm wide, 1645mm long
Horizontal 4.66mm thick, 31.75mm wide, 1645mm long, pultruded fiberglass

Pockets
Lexan or Heavy Duty Triangular Fabric

 Korman Signs	
Schematic Drawing for Model SS548UCA Ultra Compact Sign Stand w/ 48x48 Roll Up Sign	
No TYPIC SCALE	1 of 4
814199	DWG.NOK8129

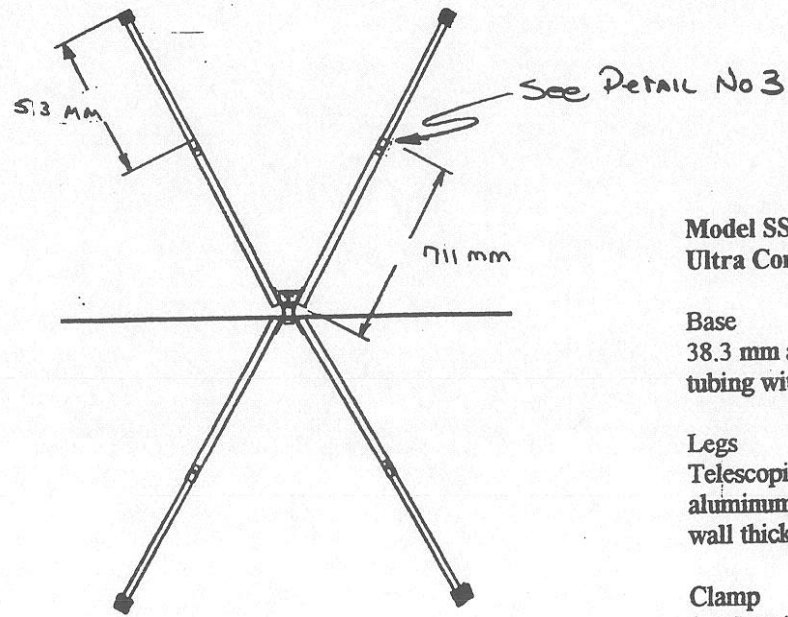
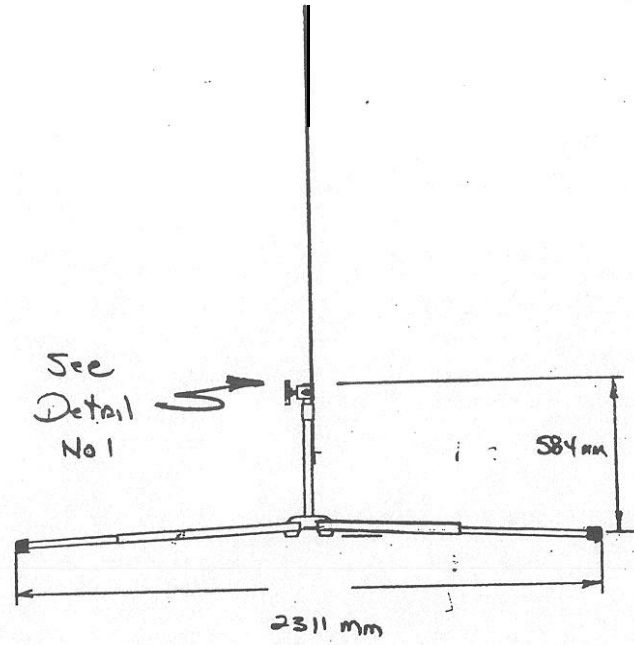
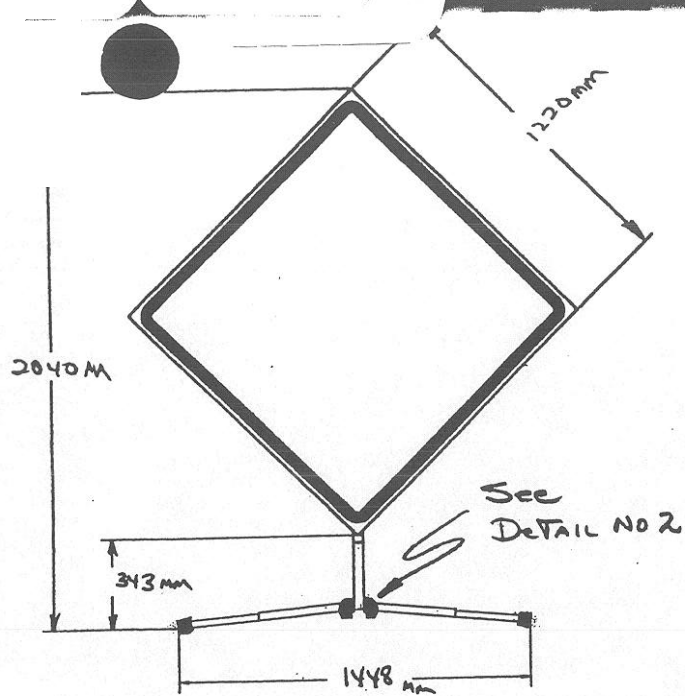


Model SS548UCA
Ultra Compact Sign Stand

Base
31.75 mm x 2.1mm square steel tubing with 4.91 mm steel leg mtg flanges

Legs
Telescopic 31.70mm and 25.42 mm square aluminum tubing with 2.56mm and 2.46mm wall thickness, respectively

Springs
Extension type



**Model SS548UCRA
Ultra Compact Sign Stand**

Base
38.3 mm and 32.07 mm square steel tubing with 4.91mm steel leg mtg flanges


Legs
Telescopic 31.70 and 25.42 mm square aluminum tubing with 2.56 mm and 2.46 mm wall thickness, respectively

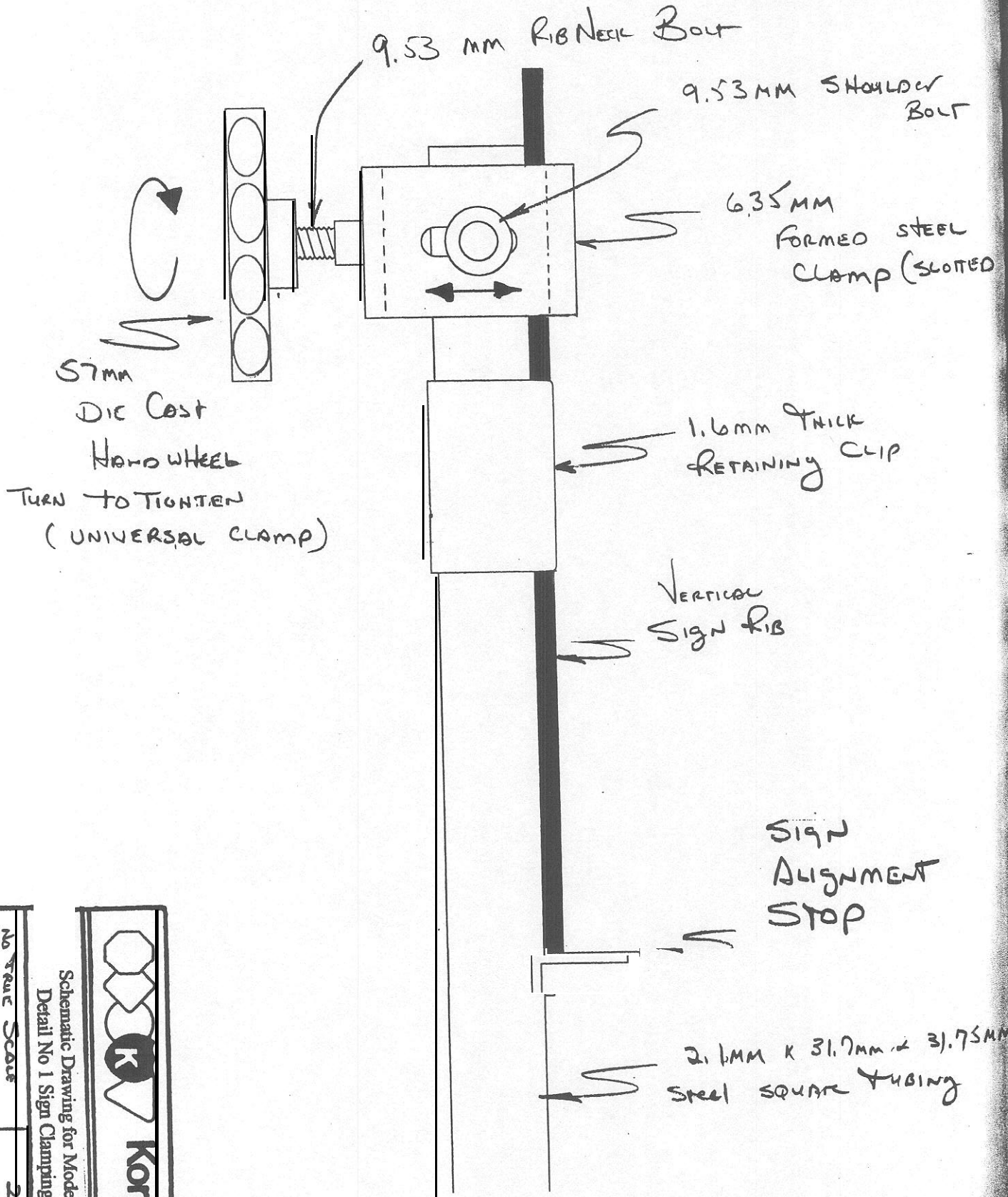
Clamp
See Detail No 1

**Model 4848DFUC
Roll Up Sign**

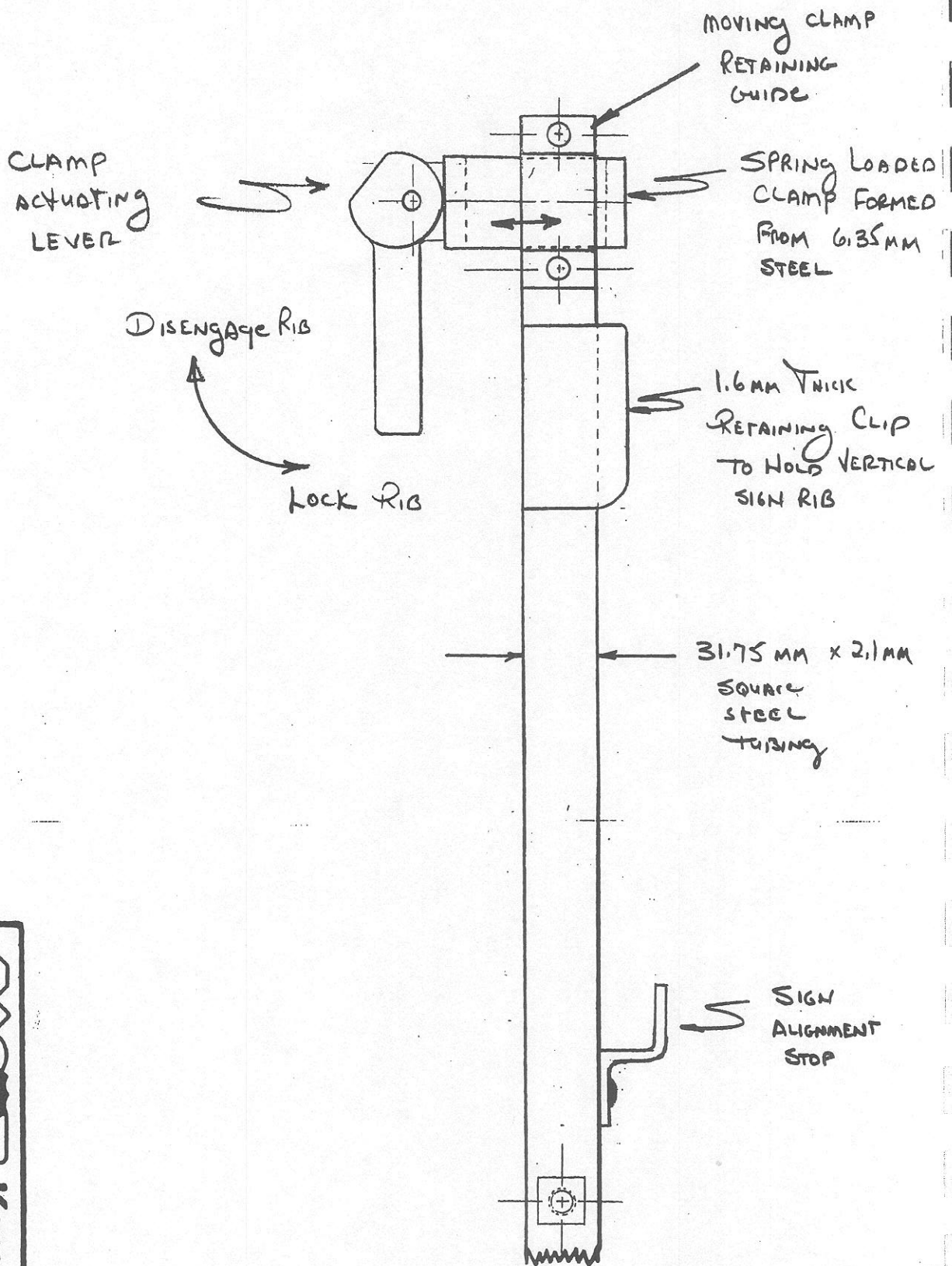
Fabric
1220mm x1220mm Reflective Roll up Sign Sheeting

Crossbraces
Vertical 9.53mm thick, 31.75 mm wide, 1645 mm long Horizontal 4.66 mm thick, 31.75 mm wide, 1645 mm long pultruded fiberglass

 Korman Signs INC.	
Schematic Drawing for Model SS548UCRA Ultra Compact Sign Stand w/ 48x48 Roll up Sign	
NOT FOR SCALE	1 OF 4
8/4/99	DWG. NO. K 849



<p>Schematic Drawing for Model SS-548UCRA Detail No 1 Sign Clamping Mechanism</p>	
<p>No. SCALE</p>	<p>2 OF 4</p>
<p>2/1/199</p>	<p>DW. NO. K199B</p>



Korman Signs
INC.

Schematic Drawing for Model SS548UCA
Detail No 1 Sign Clamping Mechanism

NO TRUE SCALE

2 of 4

8/12/99

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DW

K8129B