



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

May 24, 2000

400 Seventh St SW,  
Washington DC 20590

Refer to: HSA-1/WZ-25

Mr. Grant Dicke  
Dicke Tool Company  
120 I Warren Avenue  
P.O. Box 518  
Downers Grove, IL 60515

Dear Mr. Dicke:

Thank you for your May 3 facsimile message to Mr. Nicholas Artimovich of my office regarding Federal Highway Administration (FHWA) acceptance of a number of your company's portable sign stands. You were responding to our request for clarification of several matters regarding your letters of July 27 and November 17, 1999. Accompanying your earlier letters were copies of test reports by Midwest Roadside Safety Facility (MwRSF) and video documentation of the crash tests. You requested that we find the tested sign stands acceptable as crashworthy devices for use on the National Highway System (NHS).

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 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 memorandum lists devices that are acceptable under Categories I, II, and III. Your company's devices are classified as Category II.

Enclosure 1 is a list enumerating the various devices for which you are requesting acceptance. Enclosure 2 consists of drawings of each of these devices, and Enclosure 3 summarizes the crash tests conducted. Systems you had tested were various portable sign stands of steel, aluminum and/or fiberglass construction. Details of the sign stands are in the enclosures.

Full-scale automobile testing was conducted on your company's portable sign supports. Early on, 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. Repeated testing of portable sign stands showed that the second device struck did not show any more potential to penetrate the occupant compartment or to cause the vehicle to go out of control. You reconsidered this situation in the case of the two sign stands that were the subject of the July 29 letter which were only tested head-on. They were later retested at 90 degrees and included in your November 17 submission.

Because the devices are free-standing and have a low mass such that significant vehicle velocity change was not expected, measurement of occupant impact velocities and ridedown accelerations were not conducted. The primary purpose of the tests was to assess the potential for occupant compartment intrusion and the test vehicle's post-impact trajectory

The following devices were tested with successful results:

(System 34) Model number DF4700. A heavy-duty, torsion spring mounted sign support, with a 1218 mm square vinyl sign mounted at 2105 mm above the pavement with two wood-staffed flags mounted at 3820 mm. The two-part aluminum mast extends to the top of the sign. (Similar to Systems 38 and 39 below with different sign panels, and the legs are telescoping.)

(System 35) Model number Uniflex 2000. A single upright coil spring mounted sign support, with a 1218 mm square vinyl sign panel mounted at 270 mm above the pavement with two fiberglass-staffed flags mounted at 1988 mm. The aluminum mast of this stand is only high enough to elevate the vertical fiberglass support rib of the sign. (Similar to System 45 below with a different sign panel.)

(Systems 38 and 39) Model number DF-4700TX. A heavy-duty torsion spring mounted sign support with a 1218 mm square vinyl sign mounted at 2134 mm above the pavement with three wood-staffed flags mounted at 3835 mm. The two-part aluminum mast extends to the top of the sign.

(Systems 40 and 41) Model number QFV84 (or Model number SE7) A heavy-duty torsion spring mounted sign support with a 1218 mm square vinyl sign mounted at 2134 mm above the pavement with three wood staffed flags mounted at 3626 mm. The two-part aluminum mast extends to a point roughly midway between the center and the top of the sign.

(System 44) Model number DF3003 Heavy duty torsion spring mounted sign support with a 1218 mm vinyl sign mounted at 356 mm above the pavement with two wood staffed flags mounted at 2073 mm. The aluminum mast extends to the top of the sign.


(System 45) Model number Uniflex 2000 or Model UF2000. A single upright coil spring mounted sign support with a 1218 mm square vinyl sign mounted at 305 mm above the pavement and two fiberglass staffed flags mounted at 2013 mm. The aluminum mast of this stand is only high enough to elevate the vertical fiberglass support rib of the sign.

During the tests the most extensive windshield damage was minor to moderate cracking. There was no occupant compartment intrusion or deformation observed, nor did any test article debris show potential for penetrating the occupant compartment. The results of this testing met the FHWA requirements and, therefore, the devices listed in Enclosure 1 are acceptable for use on the NHS under the range of conditions tested as NCHRP Report 350 Test Level 3 devices, when proposed by a State.

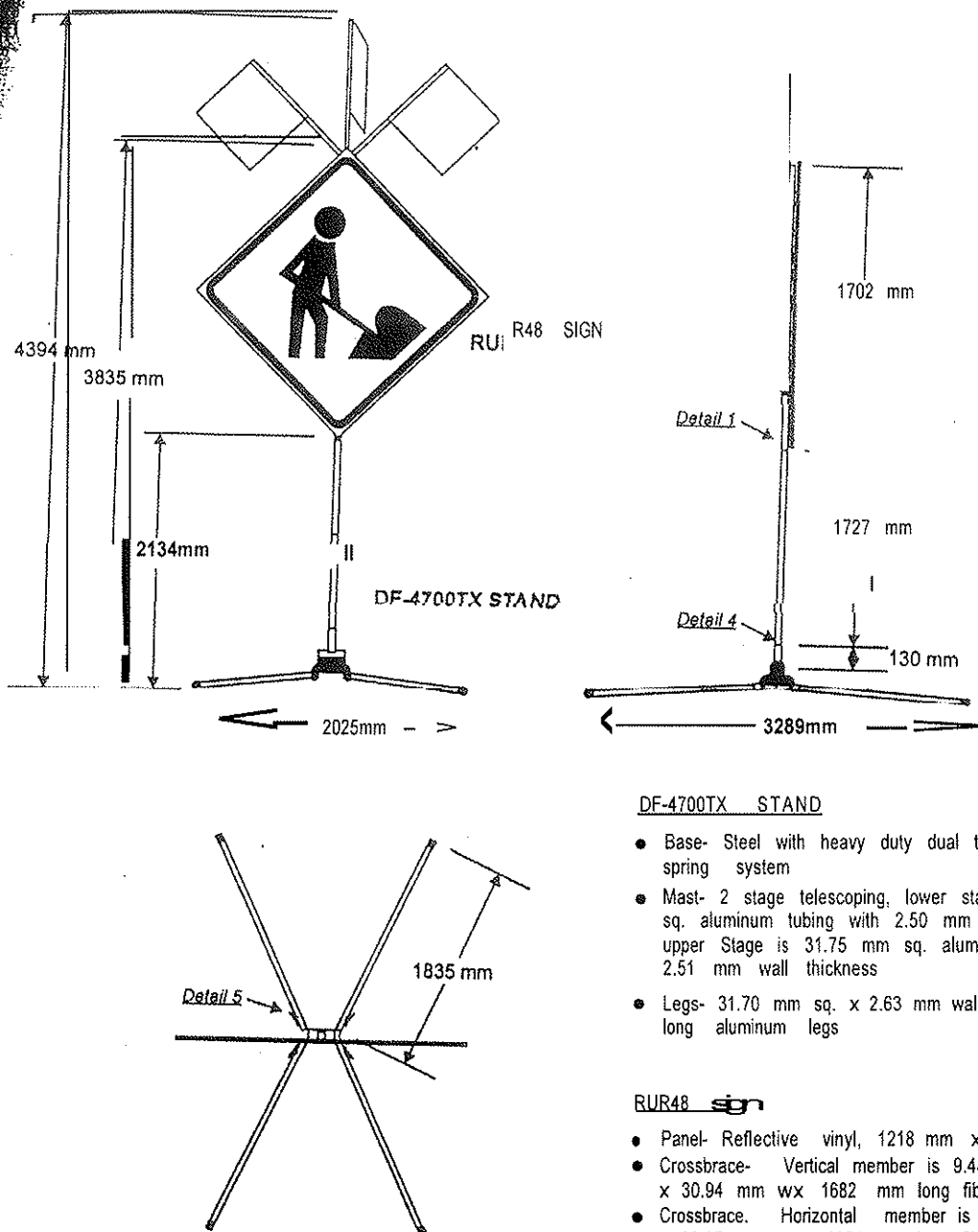
Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices. Presumably, you will supply potential users with sufficient information on design and installation requirements to ensure proper performance. We anticipate that the States will require certification from Dicke Tool Company that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as those which were tested and submitted for acceptance. To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-25, shall not be reproduced except in full including Enclosure 1.

Your traffic control devices may be patented products or contain patented features. If so, they would be 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 may be found as Enclosure 4.

Sincerely yours,

  
Frederick G. Wright, Jr.  
Program Manager, Safety

4 Enclosures



DF-4700TX STAND

- Base- Steel with heavy duty dual torsion spring system
- Mast- 2 stage telescoping, lower stage is 38.08 mm sq. aluminum tubing with 2.50 mm wall thickness and upper Stage is 31.75 mm sq. aluminum tubing with 2.51 mm wall thickness
- Legs- 31.70 mm sq. x 2.63 mm wall x 1835 mm long aluminum legs

RUR48 sign

- Panel- Reflective vinyl, 1218 mm x 1215 mm
- Crossbrace- Vertical member is 9.48 mm th. x 30.94 mm wx 1682 mm long fiberglass
- Crossbrace. Horizontal member is 4.89 mm th. x 29.97 mm w x 1654 mm long fiberglass
- 3 Flags- 451 mm x 457 mm vinyl with 610 mm long (19.05 mm dia.) wood staff

Figure 1. System Nos. 38 and 39 Sign Support Details, Test D-20

Enclosure I, Summary of Crash Tested Work Zone Traffic Control Devices, Dicke Tool Co.

| Device                             | Test | System | Orientation | Legs               | Base                  | Mast                 | Horiz. Spreader     | Height(ex flags) | Flags  |
|------------------------------------|------|--------|-------------|--------------------|-----------------------|----------------------|---------------------|------------------|--------|
| DF-4700 Stand                      | D-18 | 34     | Head On     | Alum., telescoping | Dual torsion spring   | Alum., full height   | Fiberglass 5.10 mm  | 3820 mm          | Wood   |
| DF-4700TX Stand                    | D-20 | 38     | Head On     | Alum., rigid       | Dual torsion spring   | 1 Alum., full height | Fiberglass 4.89 mm  | 3835 mm          | Wood   |
| DF-4700TX Stand                    | D-20 | 39     | End On      | Alum., rigid       | Dual torsion spring   | Alum., full height   | Fiberglass 4.89 mm  | 383.5 mm         | Wood   |
| QFV84 (or SE7) Stand               | D-21 | 40     | Head On     | Alum., rigid       | Extension spring      | Alum., full height   | Fiberglass 4.89 mm  | 3854 mm          | Wood   |
| QFV84 (or SE7) Stand               | D-21 | 41     | End On      | Alum., rigid       | Extension spring      | Alum., full height   | Fiberglass 4.89 mm  | 3854 mm          | Wood   |
| DF 3003 Stand                      | D-23 | 44     | End On      | Alum., telescoping | Dual torsion spring   | Alum., full height   | Fiberglass 4.88 mm  | 2073 mm          | Wood   |
| Uniflex 2000 Stand                 | D-18 | 35     | Head On     | Alum., telescoping | Single upright spring | Fiberglass, 9.48 mm  | Fiberglass 4.89 mm  | 1988 mm          | Fiber. |
| Uniflex 2000 or Model UF2000 Stand | D-23 | 45     | End On      | Alum., telescoping | Single upright spring | Fiberglass, 9.55 mm  | Fiberglass, 4.84 mm | 2013 mm          | Wood   |

NOTES to Enclosure I, Dicke Tool Company. Please refer to the individual drawings for the details of each device.

DEVICE: Stand: X-footprint portable sign stand holding roll-up sign.

SIGN: All sign panels were vinyl "roll-up" material. Details are on enclosed drawings.

LEGS: All legs are of square tubular aluminum. Rigid legs are 31.75 mm square. Telescoping legs are 31.71 mm and 25.40 mm square.

BASE: "Extension Spring" are steel-with a heavy duty extension spring system.

"Dual Torsion Spring" are steel with a double torsion spring system.

"Single Upright Spring" are steel with a single upright spring system.

"Alum., full height" are square tubular aluminum supports of one to three components, sizes vary. Mast extends from the base to the top of the sign panel

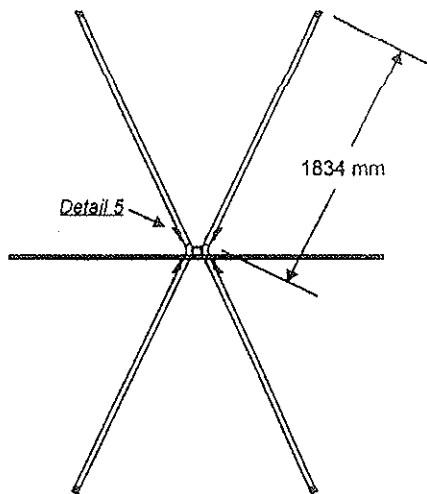
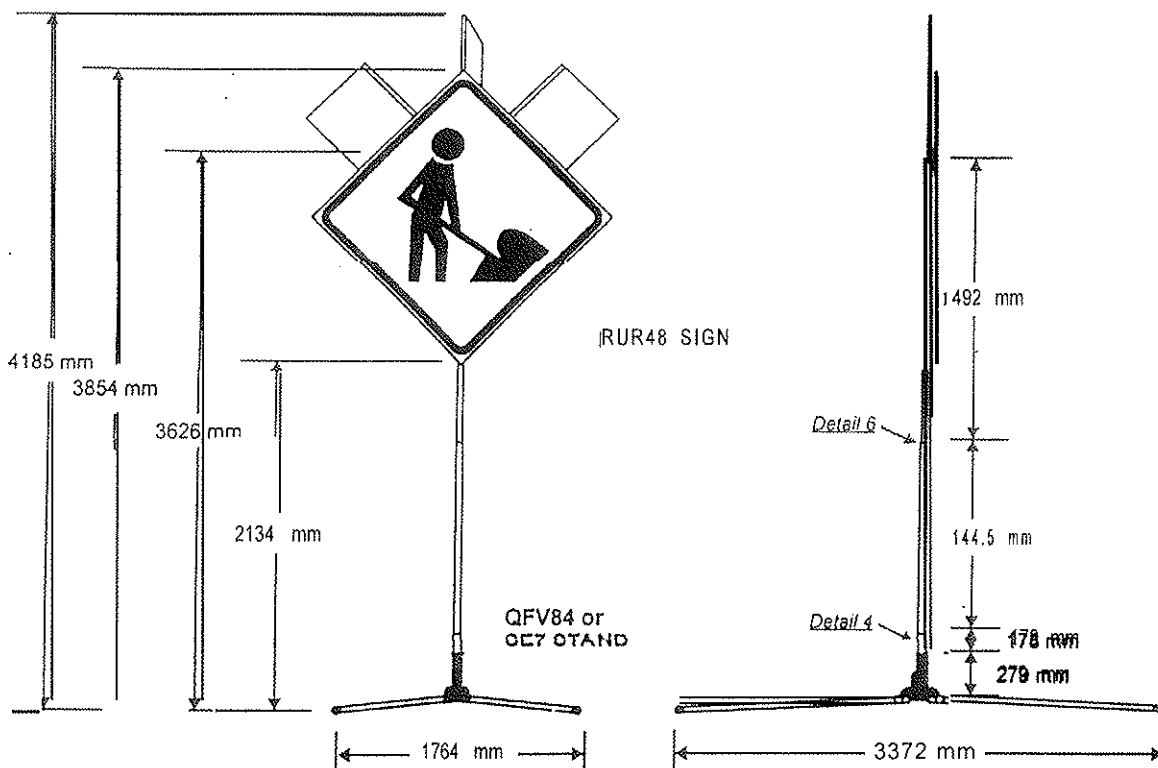
"Fiberglass" is a flexible fiberglass piece approx. 31 mm wide, of thickness as noted. It attaches to a square steel tube upright 721 mm or shorter.

This is the height from the ground to the top of the sign panel.

Material of flagstaff:

Wood = 618 mm long, 19 mm diameter wood rod.

Fiber. = 660 mm long fiberglass



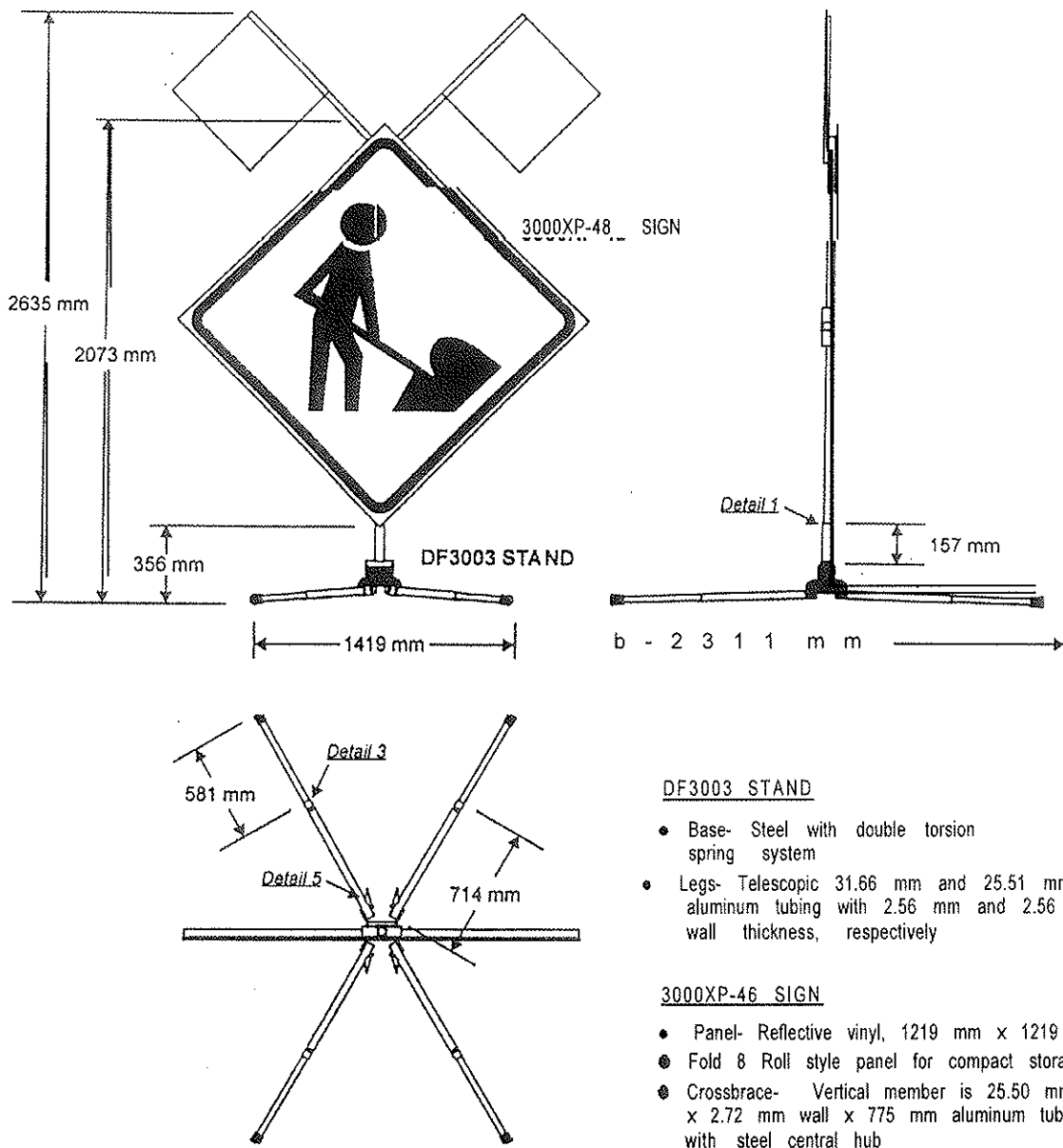
#### QFV84 or SE7 STAND

- Base- Steel with heavy duty extension spring system
- Mast- 2 stage telescoping, lower stage is 38.12 mm sq. aluminum tubing with 2.54 mm wall thickness and upper stage is 31.73 mm sq. Aluminum tubing with 2.57 mm wall thickness
- Legs- 31.70 mm sq. x 2.98 mm wall x 1034 mm long aluminum legs

#### RUR48 SIGN

- Panel- Reflective vinyl, 1216 mm x 1218 mm
- Crossbrace- Vertical member is 9.48 mm th. x 30.94 mm w x 1882 mm long fiberglass
- Crossbrace- Horizontal member is 4.89 mm th. x 29.97 mm w x 1654 mm long fiberglass
- 3 Flags- 451 mm x 457 mm vinyl with 610 mm long (19.05 mm dia.) wood staff

Figure 4. System Nos. 40 and 41 Sign Support Details, Test D-21



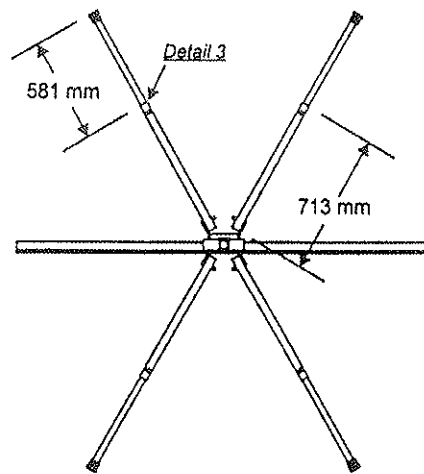
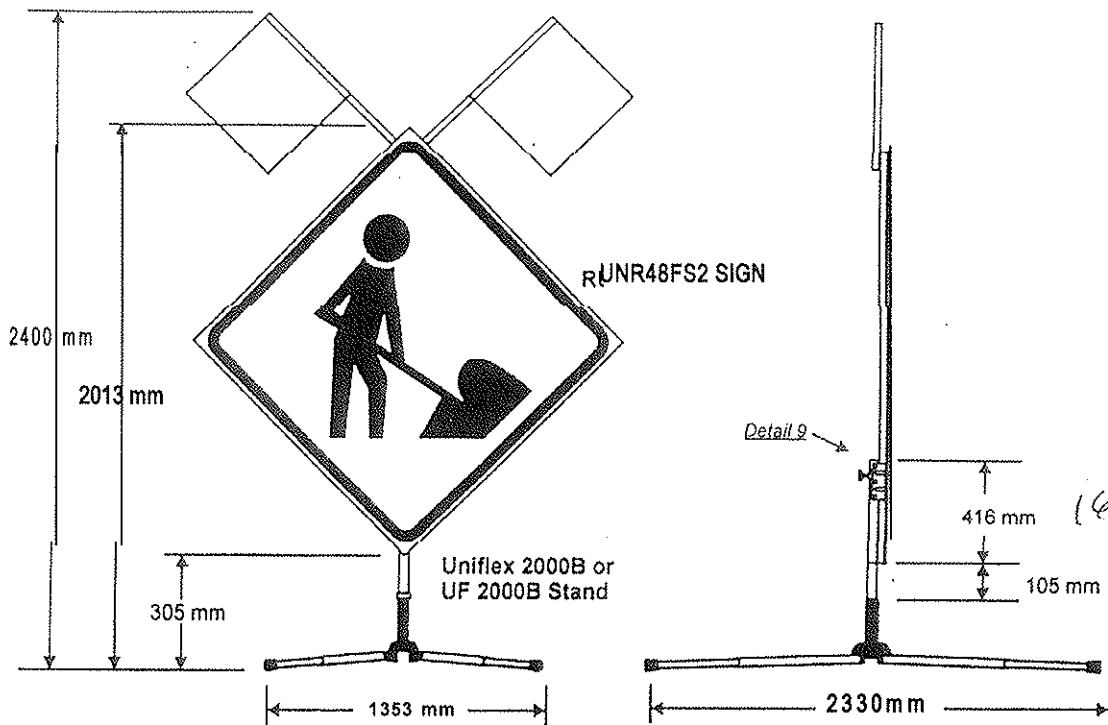
DF3003 STAND

- Base- Steel with double torsion spring system
- Legs- Telescopic 31.66 mm and 25.51 mm sq. aluminum tubing with 2.56 mm and 2.56 mm wall thickness, respectively

3000XP-46 SIGN

- Panel- Reflective vinyl, 1219 mm x 1219 mm
- Fold 8 Roll style panel for compact storage
- Crossbrace- Vertical member is 25.50 mm sq. x 2.72 mm wall x 775 mm aluminum tubing with steel central hub
- Crossbrace- Horizontal member is 4.66 mm th. x 24.60 mm w x 775 mm long fiberglass
- 2 Flags- 436 mm x 464 mm vinyl with 610 mm long (19.66 mm dia.) wood staff

Figure 10. System No. 44 Sign Support Details, Test D-23



**Uniflex 2000B or UF 2000B Stand**

- Base- Steel with single upright spring system
- Legs- Telescopic 31.71 mm and 25.40 mm sq. aluminum tubing with 2.77 mm and 2.53 mm wall thickness, respectively

**RUNR48FS2 SIGN**

- Panel- Reflective vinyl, 1219 mm x 1224 mm
- Crossbrace- Vertical member is 9.55 mm th. x 30.17 mm wx 1683 mm long fiberglass
- Crossbrace- Horizontal member is 4.84 mm th. x 29.73 mm w x 1653 mm long fiberglass
- 2 Flags- 457 mm x 457 mm vinyl with 3.17 mm th. x 24.80 mm w x 587 mm long fiberglass staff

Figure 12. System No. 45 Sign Support Details, Test D-23



Enclosure 3, Summary of Crash Tests for Work Zone Traffic Control Devices, Dicke Tool Co.

| Device                             | Test | System | Orientation | Vehicle Impact Speed | Vehicle Delta V | Windshield Damage          |
|------------------------------------|------|--------|-------------|----------------------|-----------------|----------------------------|
| DF-4700 Stand                      | D-18 | 34     | Head On     | 101.4 km/hr          | 0.5 m/s         | Minor to moderate cracking |
| DF-4700TX Stand                    | D-20 | 38     | Head On     | 96.6 km/hr           | 0.69 m/s        | None                       |
| DF-4700TX Stand                    | D-20 | 39     | End On      | 94.1 km/hr           | unknown         | None                       |
| QFV84 (or SE7) Stand               | D-21 | 40     | Head On     | 106.5 km/hr          | 1.83 m/s        | None                       |
| QFV84 (or SE7) Stand               | D-21 | 41     | End On      | 99.9 km/hr           | Unknown         | None                       |
| DF 3003 Stand                      | D-23 | 44     | End On      | 102.1 km/hr          | 0.5 m/s         | None                       |
| Uniflex 2000 Stand                 | D-18 | 35     | Head On     | 99.6 km/hr           | Unknown         | Minor to moderate cracking |
| Uniflex 2000 or Model UF2000 Stand | D-23 | 45     | End On      | 100.4 km/hr          | Unknown         | None                       |