Ms. Kathy Rogalla
Project Leader
Marketing Displays International
38271 W. Twelve Mile Rd
Farmington Hills, MI  48331-3041

Dear Ms. Rogalla:

Thank you for your letters of December 5, 2000, and January 24, requesting Federal Highway Administration (FHWA) acceptance of your company’s portable sign stands as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letters were detailed drawings of the stands, reports from Safety Quest, Inc., 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.” A March 12 letter from Dr. Dean Alberson of Safety Quest attested to the performance of these sign stands when used with plywood sign panels.

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:

Model 4860K, tested with Endurance panel and Aluminum panel:
[Tests MDI 3 and MDI 4]
This stand is manufactured with two vertically mounted steel coil springs to support 1219 x 1219 x 2 mm (48 x 48 x 0.080 inch) signs. The base of the stand consists of an autophoreic coated 5 mm thick steel base, four telescoping legs, and two coil springs. The legs are 3 mm x 32 mm x 32 mm (0.10 x 1.25 x 1.25 inch) 6061-T6 aluminum tubing. A 3 mm x 38 mm x 38 mm (0.10 x 1.5 x 1.5 inch) extruded aluminum lower mast is mounted to the top of the springs. The lower mast is attached to the springs with two 10 mm x 64 mm (0.375 - 18 x 2.5 inch) bolts through an L-bracket. The lower mast is scored at the top of the L-bracket around its
circumference and the corners are cut as to not penetrate all the way through the material. In addition, a 10 mm (0.375 inch) hole is drilled through the lower mast approximately 38 mm (1.5 inch) up from the top of the L-bracket through the axis parallel to the sign blank. A 3 mm x 32 mm (0.1 x 1.25 x 1.25 inch) 6061-T6 aluminum upright is mounted to the lower mast and held into place with push-button spring pins. The sign panel is attached to the upper and lower masts with a rigid steel mounting bracket that is clamped to the masts. Attached to the top of the upper mast is a steel flag lock bracket that holds three wood handled vinyl roll-up flags.

The overall height of the MDI 4860K sign stand with vinyl flags mounted above is 4013 mm (158 inches) and 3252 mm (128 inches without flags). The bottom of the sign is mounted 1524 mm (60 inches) above grade. The total weight of the sign stand with a 4.8 kg (10.5 pound) Endurance sign panel and flags is 26.3 kg (58 pounds) as tested in MDI 3. The total weight with a 2 mm (0.080 inch) 8.4 kg (18.5 pound) aluminum sign panel is 29.9 kg (66 pounds) as tested in MDI 4.

**Model 4860K, with breakaway feature, tested with Aluminum panel and light:**
[Test MDI 6]  
This stand is manufactured with two vertically mounted steel coil springs to support 1219 x 1219 x 2 mm (48 x 48 x 0.080 inch) aluminum signs. The four legs of the stand are 32 x 32 x 2.5 mm (1.25 x 1.25 x 0.10 inch) square 6061-T6 extruded aluminum tubing. The coil springs attach the 5 mm (0.19 inch) thick autophoretic coated steel base to the telescoping upright. The two piece, upright, consisting of a 38 mm (1.50 inch)(bottom) and a 32 mm (1.25 inch)(top) square aluminum tube, supports the sign. The bottom upright has a scored “breakaway section” at 483 mm (19 inches) above grade when the stand is fully assembled. Rigid sign mounting brackets support the aluminum sign at top and bottom and a steel flag lock bracket is attached to the top upright supporting three hardwood dowel flags. A barricade light assembly, consisting of two 6 volt batteries and a 178 mm (7 inch) polycarbonate lens, is mounted to the top upright above the flag bracket.

The overall height of the stand, with flags and light is 4115 mm (162 inches) and 3251 mm (128 inches) without the light and flags. The bottom of the sign is mounted 1524 mm (60 inches) above grade. The total weight of the sign stand is 31.6 kg (69.7 pounds) which includes the stand of 21.7 kg (47.7 pounds), the sign and flags of 8.4 kg (18.5 pounds) and the light of 1.6 kg (3.5 pounds) as tested in MDI 4.

**Model 4818 sign stand with breakaway feature, tested with aluminum sign panel and flags**
[Test MDI 8]  
The MDI model 4818 is a portable, compact sign stand that is manufactured with two vertically mounted steel coil springs to support 1219 x 1219 x 2 mm (48 x 48 x 0.080 inch) aluminum signs. The four legs of the stand are 32 x 32 x 2.5 mm (1.25 x 1.25 x 0.10 inch) square 6061-T6 extruded aluminum tubing. The coil springs attach the 5 mm (0.19 inch) thick autophoretic coated steel base to the telescoping upright. The two piece, upright, consisting of a 38 mm (1.50 inch)(bottom) and a 32 mm (1.25 inch)(top) square aluminum tube, supports the sign. The bottom upright has a scored “breakaway section” at 457 mm (18 inches) above grade when the stand is fully assembled. Rigid sign mounting brackets support the aluminum sign at top and bottom and a polycarbonate flag lock bracket is attached to the top upright, supporting three hardwood dowel flags.
The overall height of the stand, with flags is 3023 mm (119 inches) and 2184 mm (86 inches) without the light and flags. The bottom of the sign is mounted 457 mm (18 inches) above grade. The total weight of the sign stand is 21.5 kg (47.4 pounds) which includes the stand of 12.8 kg (28.2 pounds), the sign and flags of 8.7 kg (19.2 pounds).

You also requested that we accept the following signs with the 4860K and the 4818 stands:

<table>
<thead>
<tr>
<th>Size</th>
<th>Material</th>
<th>Weight</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>915 mm (36”x36”)</td>
<td>Aluminum</td>
<td>5.2 kg (11.5#)</td>
<td>2 mm (0.080”)</td>
</tr>
<tr>
<td>1220 mm (48”x48”)</td>
<td>Plywood</td>
<td>15.9 kg (35#)</td>
<td>16 mm (5/8”)</td>
</tr>
<tr>
<td>915 mm (36”x36”)</td>
<td>Plywood</td>
<td>15.9 kg (35#)</td>
<td>16 mm (5/8”)</td>
</tr>
<tr>
<td>1220 mm (48”x48”)</td>
<td>Endurance</td>
<td>4.8 kg (10.5#)</td>
<td>16 mm (5/8”)</td>
</tr>
<tr>
<td>915 mm (36”x36”)</td>
<td>Endurance</td>
<td>3.0 kg (6.5#)</td>
<td>16 mm (5/8”)</td>
</tr>
<tr>
<td>1220 mm (48”x48”)</td>
<td>Alpolic</td>
<td>4.8 kg (10.5#)</td>
<td>2.5 mm (0.10”)</td>
</tr>
<tr>
<td>915 mm (36”x36”)</td>
<td>Alpolic</td>
<td>3.0 kg (6.5#)</td>
<td>2.5 mm (0.10”)</td>
</tr>
<tr>
<td><strong>Tested Sign:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1220 mm (48”x48”)</td>
<td>Aluminum</td>
<td>5.2 kg (18.5#)</td>
<td>2 mm (0.080”)</td>
</tr>
</tbody>
</table>

You also requested the use of plywood signs but their weight, approximately twice that of the tested aluminum signs, caused us to ask for further analysis. The March 12 letter from Dr. Alberson predicts acceptable performance of this stand with plywood, stating that the increased sign inertia could assist in the activation of the breakaway mechanism and would serve to slow the angular rotation of the sign panel. There would be no greater likelihood that the sign would impact the test vehicle. Indeed, the increased sign inertia would allow the vehicle to pass under the rotating sign with additional clearance.

You also requested acceptance of your **Model 5018**, which is similar to the Model 50SM and Model 4818 with the “Break Away” feature added to the aluminum upright tested (see table below). It has steel legs and base (from the 50SM) and an aluminum upright with the breakaway feature as tested with the Model 4818.

**Testing**

Full-scale automobile testing was conducted on your company’s devices. Two stand-alone examples of each 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 tests are summarized in the table below:

<table>
<thead>
<tr>
<th>Test Number</th>
<th>MDI 3</th>
<th>MDI 4</th>
<th>MDI 6</th>
<th>MDI 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Article</td>
<td>4860K</td>
<td>4860K</td>
<td>4860K</td>
<td>4818</td>
</tr>
<tr>
<td>Breakaway</td>
<td>Breakaway</td>
<td>Breakaway</td>
<td>Breakaway</td>
<td></td>
</tr>
<tr>
<td>Sign substrate</td>
<td>Endurance</td>
<td>Aluminum</td>
<td>Aluminum</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Height to Bottom of Sign</td>
<td>1524 mm</td>
<td>1524 mm</td>
<td>1524 mm</td>
<td>457 mm</td>
</tr>
<tr>
<td>Height to Top of Sign</td>
<td>3252 mm</td>
<td>3252 mm</td>
<td>3251 mm</td>
<td>2184 mm</td>
</tr>
<tr>
<td>Flags or lights</td>
<td>3 flags</td>
<td>3 flags</td>
<td>2 flags, light</td>
<td>3 flags</td>
</tr>
<tr>
<td>Test Article Mass (each)</td>
<td>26.3 kg</td>
<td>29.9 kg</td>
<td>31.6 kg</td>
<td>21.5 kg</td>
</tr>
<tr>
<td>Vehicle Inertial Mass</td>
<td>802 kg</td>
<td>802 kg</td>
<td>822 kg</td>
<td>822 kg</td>
</tr>
<tr>
<td>Impact Speed, Head-on</td>
<td>101.7 kph</td>
<td>100.9 kph</td>
<td>98 kph</td>
<td>101 kph</td>
</tr>
<tr>
<td>Vehicle damage</td>
<td>Punctured oil pan &amp; radiator</td>
<td>Punctured oil pan &amp; radiator</td>
<td>Scraps and Dents</td>
<td>Scraps and Dents</td>
</tr>
<tr>
<td>Occupant Compartment Intrusion</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Windshield Damage</td>
<td>37.75 mm deformation*</td>
<td>None</td>
<td>None</td>
<td>Moderate**</td>
</tr>
</tbody>
</table>

* Both layers of glass were broken but the plastic laminate was not punctured. The area of deformation was approximately one foot in diameter, with a maximum deformation towards the occupants of 31.75 mm (1.25 inches.)

** There was localized cracking from the end-on hit near the bottom of the passenger side windshield, and generalized cracking from the head-on impact, but there was no significant deformation, nor was cracking extensive enough to block the driver’s view ahead.

**Findings**

Damage was limited to cracking of the windshield when the signs struck the glass, and to the undercarriage of the test vehicles. None of the damage modes appeared to have the potential for penetrating the passenger compartment. The results of test met the FHWA requirements and, therefore, the Model 4860K and Model 4818 stands, both with the breakaway feature, 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.

- Because of the successful performance of these stands with Endurance (4860K) and aluminum (4860K and 4818) substrates we consider them to be acceptable with 2.5 mm Alpolic substrate signs as well. Similarly, we consider the 4818 to be acceptable with the Endurance substrate as well.
- Because of the successful performance with the 48x48 sign panels, we will also consider them acceptable with the smaller 36x36 panels. However, the 4860K stand should support the 36x36 panel **at the same height to the top as the tested 48x48 sign**. This would result in a **mounting height of 1955 mm (77 inches) to the bottom.** Tall sign stands,
such as the 4860K perform in an acceptable manner in part due to the sign and mast striking the roof line of the test vehicle. If you use a 36x36 sign panel at the “regular” mounting height you lower the top of the entire assembly by 430 mm (17 inches) which may significantly alter the performance.

- Because of the acceptable performance of the 4818 stand, and because of its similarity to the previously accepted Model 50SM (tested by Texas at TTI, letter WZ-3), we will also consider the 5018 stand acceptable with the breakaway feature when used with the sign materials and sizes discussed above.
- Because of the acceptable performance of the breakaway feature, and the likelihood that the increased inertia of a plywood sign would enhance the breakaway performance of the system, the 4860K Breakaway and the 4818 Breakaway sign stands will be acceptable when used with 16 mm plywood signs.

Summary

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-69, 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.
- MDI portable 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
VINYL FLAGS
3/4 DIA.
HARDWOOD
DOWELS; 30" LONG

LIGHT FLASHER
DIEZ 670
6 VOLT BARRICADE LIGHT
WITH BATTERIES
BLINKING OR STEADY BURN
7" FOLYCARBONATE LENS
WEIGHT: 3 lbs 6 oz

48x46"x0.080
ALUMINUM SIGN

BREAKAWAY SECTION

HHCS 3/8-18x2-1/2
BOLTS

(2) COIL SPRINGS

51"

68"

162"

60"

19"

123"

SCHEMATIC DRAWING

FLAG LOCK
STEEL BRACKET

SA-01729
RIGID SIGN
MOUNTING STEEL BRACKET

LEGS CONNECTED
WITH BOLTS
3/8-18x1-3/4

1.25 x 1.25" ALUMINUM
TOP UPRIGHT

1.50 x 1.50" ALUMINUM
BOTTOM UPRIGHT

.100 WALL THICKNESS
6061-16
ALUMINUM ALLOY LEG

MOLDED RUBBER
LEG CAPS,
RIVETED WITH
(2) 3/16x1/2
ALUM. POP RIVETS

HRS STEEL BASE
3/16"
AUTOPHORETIC COATED

4860 WEIGHT:
ALUMINUM SIGN----18.5 LB
LIGHT FLASHER----3.5 LB
SIGN STAND WITH
RIGID SIGN BRACKETS----47.7 LB
TOTAL----69.7 LB

MDI

DATE: 12/15/00

NAME: MODEL 4860
VINYL FLAGS
3/4 DIA., HARDWOOD DOWELS; 30" LONG

LIGHT FLASHER
DIETZ 670
6 VOLT BARRICADE LIGHT WITH BATTERIES BLINKING OR STEADY BURN 7" POLYCARBONATE LENS WEIGHT: 3 lb 6 oz

48x48"x0.080 ENDOURANCE SIGN

BREAKAWAY SECTION

HHCS 3/8-18x2-1/2x 40.15

(2) COIL SPRINGS

68" 162"

19 51"

51"

123"

SCHEMATIC DRAWING

FLAG LOCK STEEL BRACKET

SA-0129 RIGID SIGN MOUNTING STEEL BRACKET

LEGS CONNECTED WITH BOLTS 3/8-18x1-3/4

1.25 x 1.25" ALUMINUM TOP UPRIGHT

1.25x1.25" .100 WALL THICKNESS 6061-T6 ALUMINUM ALLOY LEG

1.50 x 1.50" ALUMINUM BOTTOM UPRIGHT

MOLDED RUBBER LEG CAPS, RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

HRS STEEL BASE 3/16" AUTOPHORETIC COATED

4860 WEIGHT:
ENDURANCE SIGN --- 10.5 LB
LIGHT FLASHER --- 3.5 LB
SIGN STAND WITH RIGID SIGN BRACKETS --- 47.7 LB
TOTAL --- --- --- 61.7 LB

MDI

DATE: 31/26/01
NAME: MODEL 4860
VINYL FLAGS
3/4 DIA. HARDWOOD DowELS, 30" LONG

LIGHT FLASHER
DIETZ 670 6 VOLT BARRICADE LIGHT WITH BATTERIES BLINKING OR STEADY BURN 7" POLYCARBONATE LENS WEIGHT: 3 lb 6 oz

36x36" ENDURANCE SIGN

BREAKAWAY SECTION

HHCS 3/8-18x2-1/2 BOLTS

(2) COIL SPRINGS

4860 WEIGHT:
ENDURANCE SIGN -- 6.5 LB
LIGHT FLASHER -- 3.5 LB
SIGN STAND WITH RIGID SIGN BRACKETS -- 47.7 LB
TOTAL -- -- -- -- -- -- 57.7 LB

FLAG LOCK STEEL BRACKET

LEGS CONNECTED WITH BOLTS 3/8-18x1-3/4

1.25 x 1.25" ALUMINUM TOP UPRIGHT

1.25x1.25" .100 WALL THICKNESS 6061-T6 ALUMINUM ALLOY LEG

1.50 x 1.50" ALUMINUM BOTTOM UPRIGHT

MOLDED RUBBER LEG CAPS, RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

HRS STEEL BASE 3/18" AUTOPHORETIC COATED

4860 WEIGHT:
ENDURANCE SIGN -- 6.5 LB
LIGHT FLASHER -- 3.5 LB
SIGN STAND WITH RIGID SIGN BRACKETS -- 47.7 LB
TOTAL -- -- -- -- -- -- 57.7 LB

MDI

DATE: 01/26/01
NAME: MODEL 4860
VINYL FLAGS
3/4 Dia.
3/4 Dia.
HARDWOOD
DOWELS; 30" LONG
DOWELS; 30" LONG
LIGHT FLASHER
DIETZ 670
6 VOL. BARRICADE LIGHT
WITH BATTERIES
BLINKING OR STEADY BURN
2" POLYCARBONATE LENS
WEIGHT: 36 LBS
WEIGHT: 36 LBS
48"x48"x0.080
ALUMINUM SIGN
48"x48"x0.080
ALUMINUM SIGN
BREAKAWAY SECTION
HHCS 3/8-18x2-1/2
BOLTS
HHCS 3/8-18x2-1/2
BOLTS
(2) COIL SPRINGS
(2) COIL SPRINGS
68"
68"
162"
162"
60"
60"
19"
19"
51"
51"
123"
123"

4860 WEIGHT:
ALUMINUM SIGN---- 18.5 LB
LIGHT FLASHER---- 3.5 LB
SIGN STAND WITH
RIGHT SIGN BRACKETS--47.7 LB
TOTAL---------- 69.7 LB

FLAG LOCK
STEEL BRACKET

LEGS CONNECTED
WITH BOLTS
3/8-18x1-3/4

1.25 x 1.25" ALUMINUM
TOP UPRIGHT

1.50 x 1.50" ALUMINUM
BOTTOM UPRIGHT

.100 WALL THICKNESS
6061-T6
ALUMINUM ALLOY LEG

1.25x1.25"

MOLDED RUBBER
LEG CAPS,
RIVETED WITH
(2) 3/16x1/2
ALUM. POP RIVETS

HRS STEEL BASE
3/16"
AUTOPHORETIC COATED

MDI

DATE: 01/26/01

NAME: MODEL 4860

SCHEMATIC DRAWING
VINYL FLAGS
3/4 DIA. HARDWOOD DOWELS: 30" LONG

LIGHT FLASHER
DIEZ 676
8 VOLT BARRICADE LIGHT WITH BATTERIES BLINKING OR STEADY BURN
7" POLYCARBONATE LENS WEIGHT: 3 lb 6 oz

36x36" ALUMINUM SIGN

BREAKAWAY SECTION

HHCS 3/8-18x2-1/2 BOLTS

(2) COIL SPRINGS

51"

158"

60"

51"

123"

FLAG LOCK STEEL BRACKET

LEGS CONNECTED WITH BOLTS
3/8-18x1-3/4

1.25 x 1.25" ALUMINUM TOP UPRIGHT

1.25x1.25"
.100 WALL THICKNESS
6061-T6 ALUMINUM ALLOY LEG

1.50 x 1.50" ALUMINUM BOTTOM UPRIGHT

MOLDED RUBBER LEG CAPS, RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

HRS STEEL BASE
3/16"

AUTOPHORETIC COATED

4810 WEIGHT:

ALUMINUM SIGN — 11.5 LB
LIGHT FLASHER —— 3.5 LB
SIGN STAND WITH RIGID SIGN BRACKETS —— 47.7 LB
TOTAL — — — — — — — — 62.7 LB
VINYL FLAGS
3/4 DIA.
HARDWOOD
DOWELS: 30" LONG

LIGHT FLASHER
DIEZ 670
6 VOLT BARRICADE LIGHT
WITH BATTERIES
BLINKING OR STEADY BURN
7" POLYCARBONATE LENS
WEIGHT: 3/8 6oz

36x36"
PLYWOOD
SIGN

BREAKAWAY SECTION

HHCS 3/8-18x2-1/2
BOLTS

(2) COIL SPRINGS

1.25x1.25"
1.25x1.25"

.100 WALL THICKNESS
6061-T6
ALUMINUM ALLOY LEG

HRS STEEL BASE
3/16" AUTOPHORETIC COATED

FLAG LOCK
STEEL BRACKET

LEGS CONNECTED
WITH BOLTS
3/8-18x1-3/4

1.50 x 1.50" ALUMINUM
TOP UPRIGHT

1.25 x 1.25" ALUMINUM
BOTTOM UPRIGHT

MOLDED RUBBER
LEG CAPS,
RIVETED WITH
(2) 3/16x1/2
ALUM. POP RIVETS

4860 WEIGHT:

PLYWOOD SIGN-- 20 LB
LIGHT FLASHER---- 3.5 LB
SIGN STAND WITH
RIGID SIGN BRACKETS-- 47.7 LB
TOTAL -------- 71.2 LB

MDI

DATE: 01/26/01
NAME: MODEL 4860

SCHEMATIC DRAWING
VINYL FLAGS
3/4 DIA. HARDWOOD
DOWELS; 30" LONG

LIGHT FLASHER
DIEZ 670
6 VOLT BARRICADE LIGHT
WITH BATTERIES
BLINKING OR STEADY BURN
7" POLYCARBONATE LENS
WEIGHT: 3 lb 6 oz

48x48x0.080
PLYWOOD SIGN

BREAKAWAY SECTION

HHCS 3/8-18x2-1/2
BOLTS

(2) COIL SPRINGS

68"
60"

60"
19"

31"
123"

FLAG LOCK
STEEL
BRACKET

SA-01729
RIGID SIGN
MOUNTING STEEL
BRACKET

LEGS CONNECTED
WITH BOLTS
3/8-18x1-3/4

1.25 x 1.25" ALUMINUM
TOP UPRIGHT

.100 WALL THICKNESS
6061-T6
ALUMINUM ALLOY LEG

1.50 x 1.50" ALUMINUM
BOTTOM UPRIGHT

MOLDED RUBBER
LEG CAPS,
RIVETED WITH
(2) 3/16x1/2
ALUM. POP RIVETS

HRS STEEL BASE
3/16"
AUTOPHORETIC COATED

4860 WEIGHT:

PLYWOOD SIGN---- 35 LB
LIGHT FLASHER------ 3.5 LB
SIGN STAND WITH
RIGHT SIGN BRACKETS-- 47.7 LB
TOTAL------- -86.2 LB

MDI

DATE: 01/26/01

NAME: MODEL 4860

SCHEMATIC DRAWING
VINYL FLAGS
3/4 DIA. HARDWOOD DOWELS; 30" LONG

LIGHT FLASHER
DIETZ 670
6 VOLT BARRICADE LIGHT WITH BATTERIES BURNING OR STEADY BURN
7" POLYCARBONATE LENS
WEIGHT: 3 lb 6 oz

36x36" ALUMINUM SIGN

BREAKAWAY SECTION

HHCS 3/8-18x2-1/2 BOLTS
(2) Coil Springs

51"

51"

51"

1.25 x 1.25" ALUMINUM TOP UPRIGHT

1.50 x 1.50" ALUMINUM BOTTOM UPRIGHT

1.25x1.25"
.100 WALL THICKNESS
6061-T6 ALUMINUM ALLOY LEG

MOLDED RUBBER LEG CAPS
RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

HRS STEEL BASE 3/16"
AUTOPHORETIC COATED

FLAG LOCK STEEL BRACKET

SA-01729 RIGID SIGN MOUNTING STEEL BRACKET

LEGS CONNECTED WITH BOLTS 3/8-18x1-3/4

4860 WEIGHT:
ALUMINUM SIGN-- 6.5 LB
LIGHT FLASHER---- 3.5 LB
SIGN STAND WITH RIGHT SIGN BRACKETS--47.7 LB
TOTAL-------- 57.7 LB

MDI
DATE: 01/26/01
NAME: MODEL 4860

SCHEMATIC DRAWING
VINYL FLAGS
3/4" DIA.
HARDWOOD
DOWELS; .30" LONG

ROAD WORK AHEAD

48" x 48"
ALUMINUM
SIGN

BREAKAWAY SECTION

HHCS 3/8-18 x 2-1/2
BOLTS

(2) COL SPRINGS

4818 WEIGHT:
SIGN & FLAGS ------- 19.2 LB
SIGN STAND ------- 28.2 LB
TOTAL -------- 47.4 LB

MDI
DATE: 12/15/00
NAME: MODEL 4818
VINYL FLAGS
7/8 DIA. WOOD DOWELL

48x48" ENDURANCE SIGN
BREAKAWAY SECTION
(2) COIL SPRINGS

HHCS 3/8-18x2-1/2 BOLTS

40" 82"

4818 WEIGHT:
SIGNFACE --- --- 10.5 LB
SIGN STAND --- --- 28.2 LB
TOTAL --- --- 38.7 LB

FLAG LOCK POLYCARBONATE BRACKET
SA-01729 RIGID SIGN MOUNTING STEEL BRACKET
LEGGS CONNECTED WITH BOLTS 3/8-18x1-3/4
ALUMINUM EXTRUDED 1.25 x 1.25" TOP TELESCOPING UPRIGHT
1.25x1.25" ALUMINUM LEG
STEEL BASE
EXTRUDED ALUMINUM 1.50 x 1.50" BOTTOM UPRIGHT
MOLDED RUBBER LEG CAPS RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

MDI
DATE: 01/26/01
NAME: MODEL 4818

SCHEMATIC DRAWING
ROAD WORK AHEAD

VINYL FLAGS
7/8 DIA. WOOD DOWELL

48" x 48" ALUMINUM SIGN
BREAKAWAY SECTION

(2) COIL SPRINGS

HHCS 3/8 -18 x 2 - 1/2 BOLTS

40" 82"

FLAG LOCK POLYCARBONATE BRACKET

SA-01729 RIGID SIGN MOUNTING STEEL BRACKET

ALUMINUM EXTRUDED 1.25 x 1.25" TOP TELESCOPING UPRIGHT

LEGS CONNECTED WITH BOLTS 3/8 -18 x 1 - 3/4

1.25 x 1.25" ALUMINUM LEG

EXTRUDED ALUMINUM 1.50 x 1.50" BOTTOM UPRIGHT

STEEL BASE

MOLED RUBBER LEG CAPS
RIVETED WITH (2) 3/16 x 1/2 ALUM POP RIVETS

4818 WEIGHT:
SIGNFACE -- -- 18.5 LB
SIGN STAND -- -- 28.2 LB
TOTAL -- -- 46.7 LB

SCHEMATIC DRAWING

MDI
DATE: 01/26/01
NAME: MODEL 4818
VINYL FLAGS
7/8 DIA.
WOOD DOWEL

36x36" ALUMINUM SIGN
BREAKAWAY SECTION

(2) COIL SPRINGS

HHCS 3/8-18x2-1/2 BOLTS

1.25x1.25" ALUMINUM LEG

1.50 x 1.50" BOTTOM UPRIGHT

LEGS CONNECTED WITH BOLTS 3/8-18x1-3/4
TOP TELESкопING UPRIGHT

ALUMINUM EXTRUDED 1.25 x 1.25"

EXTRUDED ALUMINUM MOUNTING STEEL BRACKET

MOLDED RUBBER LEG CAPS.
(2) 3/16x1/2 ALUM. POP RIVETS

ROAD WORK AHEAD

MOLDED RUBBER LEG CAPS.

RIGID SIGN

4818 WEIGHT:

SIGNFACE - - - - - 11.5 LB
SIGN STAND - - - - - 28.2 LB
TOTAL - - - - - 39.7 LB

MD

DATE: 01/26/01
NAME: MODEL 4818

SCHEMATIC DRAWING
4818 WEIGHT:

SIGNFACE ——— 35 LB
SIGN STAND ——— 28.2 LB
TOTAL ——— 63.2 LB

DATE: 01/26/01
NAME: MODEL 4818
VINYL FLAGS
7/8 DIA.
WOOD DOWELL

36x36"
PLYWOOD
SIGN

BREAKAWAY SECTION

(2) COIL SPRINGS

HHCS 3/8-18x2-1/2
BOLTS

40"

82"

FLAG LOCK
POLYCARBONATE BRACKET

LEGs CONNECTED
WITH BOLTS
3/8-18x1-3/4

TOP TELESCOPING
UPRIGHT

1.25x.25"
ALUMINUM
LEG

EXTRUDED ALUMINUM
1.50 x 1.50"
BOTTOM UPRIGHT

STEEL BASE
MOLDED RUBBER
LEG CAPS.
RIVETED WITH
(2) 3/16x1/2
ALUM. POP RIVETS

MDI
DATE: 01/26/01
NAME: MODEL 4818

4818 WEIGHT:
SIGNFACE ----- 20 LB
SIGN STAND ----- 28.2 LB
TOTAL ----- 48.2 LB

SCHEMATIC DRAWING
VINYL FLAGS
7/8 DIA.
WOOD DOWELL
48x48" ALPOLIC SIGN
BREAKAWAY SECTION
481B WEIGHT:
SIGNFACE: 10.5 LB
SIGN STAND: 28.2 LB
TOTAL: 38.7 LB

ROAD WORK AHEAD

FLAG LOCK
POLYCARBONATE BRACKET
LEGS CONNECTED
WITH BOLTS
3/8-18x1-3/4

1.25x1.25" ALUMINUM-LEG

EXTRUDED ALUMINUM
1.50 x 1.50"
BOTTOM UPRIGHT

STEEL BASE
MOLDED RUBBER
LEG CAPS.
RIVETED WITH
(2) 3/16x1/2
ALUM. POP 'RIVETS

METAL DRAWING
DATE: 01/26/01
NAME: MODEL 481B

SA-01729
RIGID SIGN
MOUNTING STEEL BRACKET
ALUMINUM
EXTRUDED
1.25 x 1.25"
TOP TELESCOPING UPRIGHT

(2) COIL SPRINGS
HHCS 3/8-18x2-1/2
BOLTS

82"
ROAD WORK AHEAD

VINYL FLAGS
7/8 Dia. WOOD DOWELL

48x48" ALUMINUM SIGN
BREAKAWAY SECTION

(2) COIL SPRINGS

40"

82"

5018 WEIGHT:

SIGNFACE ——— 18.5 LB
SIGN STAND ——— 35 LB
TOTAL ——— 53.5 LB

DATE: 01/26/01

NAME: MODEL 5018

MDI

LEG CONNECTED WITH BOLTS
3/8-18x1-3/4

1.00x1.00" STEEL LEG

1.50 x 1.50" BOTTOM UPRIGHT

EXTRUDED ALUMINUM

ALUMINUM EXTRUDED
1.25 x 1.25" TOP TELESCOPING UPRIGHT

FLAG LOCK POLYCARBONATE BRACKET

SA-01729 RIGID SIGN MOUNTING STEEL BRACKET

MOLDED RUBBER LEG CAPS RIVETED WITH
(2) 3/16x1/2 ALUM. POP RIVETS

STAINLESS STEEL BASE
VINYL FLAGS
7/8 DIA. WOOD DOWELL

48x48" PLYWOOD SIGN
BREAKAWAY SECTION

(2) COIL SPRINGS
HHCS BOLTS 3/8-18x2-1/2

68" 86" 18"

FLAG LOCK POLYCARBONATE BRACKET
LEGS CONNECTED WITH BOLTS 3/8-18x1-3/4
1.00x1.00" STEEL LEG

EXTRUDED ALUMINUM 1.50 x 1.50" BOTTOM UPRIGHT
STEELE BASE WELDED RUBBER LEG CAPS, RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

MDI
DATE: 01/26/01
NAME: MODEL 5018

5018 WEIGHT:
SIGN FACE ------ 35 LB
SIGN STAND ------ 35 LB
TOTAL --------- 70 LB

SCHEMATIC DRAWING
VINYL FLAGS
7/8 DIA.
WOOD DOWELL

36x36" PLYWOOD SIGN

BREAKAWAY SECTION

(2) COIL SPRINGS

HHCS 3/8-18x2-1/2 BOLTS

40"

82"

5018 WEIGHT:
SIGNFACE  - - - - - 20 LB
SIGN STAND  - - - - - 28.2 LB
TOTAL  - - - - - 48.2 LB

SCHEMATIC DRAWING

MDI
DATE: 01/26/01
NAME: MODEL 5018
ROAD WORK AHEAD

VINYL FLAGS
7/8 DIA. WOOD DOWELL

48x48" ENDURANCE SIGN
BREAKAWAY SECTION

(2) COIL SPRINGS

HHCS 3/8-18x2-1/2 BOLTS

40"

82"

FLAG LOCK POLYCARBONATE BRACKET
LEGS CONNECTED WITH BOLTS 3/8-18x1-3/4
1.00x1.00" STEEL LEG

SA-01720 RIGID SIGN MOUNTING STEEL BRACKET
ALUMINUM EXTRUDED 1.25 x 1.25" TOP TELESCOPING UPRIGHT
EXTRUDED ALUMINUM 1.50 x 1.50" BOTTOM UPRIGHT
STEEL BASE MOLDED RUBBER LEG CAPS, RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

5018 WEIGHT:
SIGNFACE - 10.5 LB
SIGN STAND - 35 LB
TOTAL - 45.5 LB

MDI
DATE: 01/26/01
NAME: MODEL 5018

SCHEMATIC DRAWING
VINYL FLAGS
7/8 DIA.
WOOD DowELL

56x36" ENDURANCE SIGN
BREAKAWAY SECTION

(2) COIL SPRINGS

HHCS 3/8-18x2-1/2 BOLTS

ROAD WORK AHEAD

FLAG LOCK POLYCARBONATE BRACKET

LEGS CONNECTED WITH BOLTS
3/8-18x1-3/4

1.00x1.00" STEEL LEG

STEEL BASE
MOLDED RUBBER LEG CAPS;
RIVETED WITH (2) 3/16x1/2 ALUM. POP RIVETS

5018 WEIGHT:

SIGNFACE -- 6.5 LB
SIGN STAND -- 35 LB

TOTAL -- 41.5 LB

MDI

DATE: 01/26/01
NAME: MODEL 5018

SCHEMATIC DRAWING
ROAD WORK AHEAD

5018 WEIGHT:
SIGN FACE ------- 10.5 LB
SIGN STAND ------- 35 LB
TOTAL ------- 45.5 LB

MDI
DATE: 01/26/01
NAME: MODEL 5018
5018 WEIGHT:

SIGNFACE --- 6.5 LB
SIGN STAND --- 35 LB
TOTAL --- 41.5 LB

DATE: 01/26/01
NAME: MODEL 5018
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.