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

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

Refer to: HSA-10\WZ-75

MR. JOHNNY NORRIS
MANAGER
MIDDLE GEORGIA SIGNS
ROUTE 1, BOX 1250
COCHRAN, GA 31014

Dear Mr. Norris:

Thank you for your letter sent January 16 requesting Federal Highway Administration (FHWA) acceptance of your company's Model MGS48A temporary sign stands using aluminum laminate substrate signs as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter was a report from E-Tech Testing Services, Inc., and a video of the crash tests. 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."

Upon our initial review we noted that the signs (substrate of "Reynobond" by Reynolds Aluminum) were mounted below the one foot minimum required by the Manual on Uniform Traffic Control Devices (MUTCD). We discussed this matter with E-Tech and learned that a firm representing another aluminum laminate sign substrate ("Dibond" distributed by Alusuisse) wished to test your stands using their signs. We reached agreement that E-Tech would conduct the 100 kmh test using your stands and the Dibond signs mounted at 1 foot. If the dynamic performance of the Dibond sign appeared to match that of the Reynobond sign, we would consider the materials comparable and your stands could be found acceptable using either substrate. That, indeed, is the conclusion we have reached.

**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 Middle Georgia Sign Model MGS48A is a compact lightweight portable sign system featuring an "A-Frame" support. The sign has four 3.175 mm formed angle iron steel upright legs interconnected with spread bars of similar construction. The material specification is ASTM A499-89 for all angle iron steel used in the sign support (this is the same "re-rolled rail steel" specification used for breakaway u-channel ground-mounted sign supports.) The uprights are

"hinged" with 12.7 mm diameter by 19.1 mm long ASTM A307 zinc plated bolts with nylon lock nuts. The uprights, spread bars, and sign connect with 7.94 mm diameter by 19.1 mm long fasteners of the same type.

The MGS48A features a 1219 mm square aluminum laminate sign made of 3 mm thick "Reynobond" substrate. The top of the sign is bolted to the upper spread bar at a single point using standard flat washers to increase the bearing area. The base of the sign rests in steel sign holder brackets attached to the uprights. When deployed the bottom of the sign is a nominal 305 mm above ground level in accord with the minimum height requirement of the MUTCD. However, for this test the sign mounting height was 152 mm. Flag holders, made up of electrical mechanical tubing, are bolted to an upright on each side of the support. Two 457 mm square vinyl fabric flags with wooden dowels were installed in the holders.

**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 6 meters downstream turned at 90 degrees, as called for in our guidance memoranda. The complete devices as tested are shown in the Enclosure 1.

As mentioned earlier, Alusuisse also tested an MGS48A stand with a Dibond sign of 2 mm thickness. The complete report on that test is not yet available, but we have reviewed the video of that test and concur that the performance of both sign installations was very similar. Data from that test made available by E-Tech is included in the table below. Observation of the videos and review of the test data indicates that the 2 mm Dibond and the 3 mm Renobond perform in a similar manner when mounted on the MGS48A stand.

The crash test is summarized in the table below:

| Test Number | 32-1641-001 | 33-4478-001 |
|---|---|---|
| Test Article | MGS48A with 3 mm Reynobond | MGS48A with 2 mm Dibond |
| Height to Bottom of Sign | 152 mm | 304 mm |
| Height to Top of Sign | 1816 mm | 2028 mm |
| Flags or lights | Two flags | Two flags |
| Test Article Mass (each) | 20.7 kg | 19.1 kg |
| Vehicle Inertial Mass | 828 kg | 810 kg |
| Impact Speed, Head-on | 102.5 km/h | 103.2 km/h |
| Impact Speed, 90 Deg. | 98.3 km/h | 99.0 km/h |
| Velocity Change, Head-on** | 1.2 m/s | 1.2 m/s |
| Occupant Compart. Intrusion | none | none |
| Windshield Damage | contact, but no cracking | minor cracking |

**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 not recorded.

**Findings**
Damage in the Reynobond test was limited to cosmetic damage to the sheet metal of the test vehicle. Only minor windshield cracking resulted from the 90 degree impact with the Dibond sign. The results of the testing met the FHWA requirements and, therefore, the MGS48A portable sign stands 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, when used with either 2 mm or 3 mm thick Reynobond or Dibond aluminum laminate signs.

Please note the following standard provisions which apply to FHWA letters of acceptance:

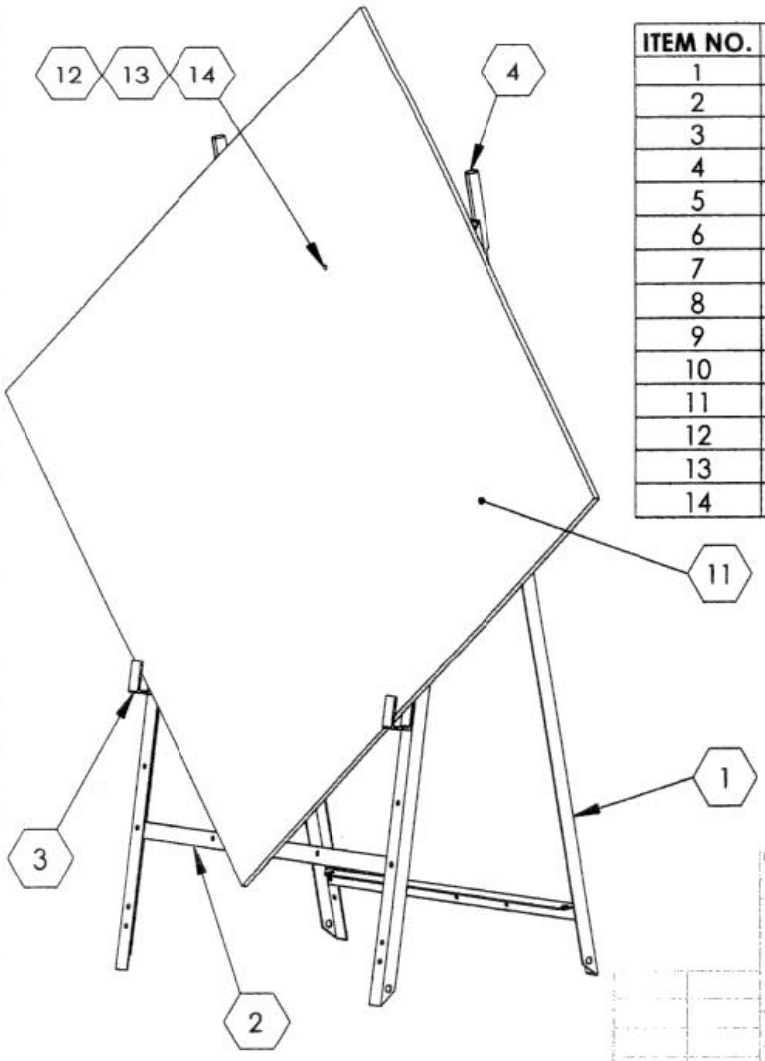
- Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the MUTCD.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover 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-75 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.
- Reynobond and Dibond materials are patented and therfore 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

Enclosure




| ITEM NO. | QTY. | PART NAME | DESCRIPTION |
|---|---|---|---|
| 1 | 4 | Uprights | SEE DETAIL DWG |
| 2 | 4 | Spread Bar | SEE DETAIL DWG |
| 3 | 2 | Sign Holder | SEE DETAIL DWG |
| 4 | 2 | Flag Holder | SEE DETAIL DWG |
| 5 | 2 | Pivot Bolts | 1/2"x3/4" Grade 5 |
| 6 | 2 | Pivot Nuts | 1/2" Nylock Nuts |
| 7 | 11 | Assy. Bolts | 5/16"x3/4" Grade 5 |
| 8 | 11 | Assy. Nuts | 5/16" Nylock Nuts |
| 9 | 4 | Flag Holder Bolts | 1/4" Carriage Head Bolts |
| 10 | 4 | Flag Holder Nuts | 1/4" Nylock Nuts |
| 11 | 1 | Sign | 48"x48" Aluminum Laminate |
| 12 | 1 | Sign Holder Bolt | 5/16"x3/4" Grade 5 |
| 13 | 2 | Sign Holder Washers | 5/16" Washers |
| 14 | 1 | Sign Holder Nylock Nuts | 5/16" Nylock Nuts |

ITEM NO. | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | MATERIAL SPECIFICATION | QTY REQD

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± XX± .XX ± 1
.XXX±.XXX

MATERIAL —

FINISH —

DO NOT SCALE DRAWING

CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE

APPROVALS | DATE
DRAWN
CHECKED
RESP ENG
MFG ENG
QUAL ENG

MIDDLE GEORGIA SIGN COMPANY

MGS48A SIGN STAND ASSEMBLY

SIZE A | DWG. NO. | REV.
SCALE | CAD FILE: | SHEET | OF

NEXT ASSY | USED ON
APPLICATION

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