



U.S. Department
of Transportation

**Federal Highway
Administration**

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

AUG 18 2000

Refer to: HSA-1

Mr. Larry M. Mims
Director of Marketing
K&K Systems, Inc.
699 Plametto Road
Tupelo, Mississippi 38801

Dear Mr. Mims:

Thank you for your June 29 letter requesting acceptance of your company's solar powered warning light/sign support systems as a breakaway supports for use on the National Highway System (NHS). Accompanying your letter was a report of crash testing done at Southwest Research Institute (SWRI) dated June 2000, and videos of the crash tests. On July 18 you provided additional information regarding a heavier configuration of warning system than the one that was tested.

Introduction

Testing of the supports was in compliance with the guidelines contained in the National Cooperative Highway Research Program (NCHRP) Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features. Requirements for breakaway supports are those in the American Association of State Highway and Transportation Officials' (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

Two crash tests were conducted, one at 35 km/hr and another at 100 km/hr. The test articles were Model 112 K&K Systems Solar Panel Sign Supports as shown in Enclosure 1. They were mounted on Marion Steel "SLIP-SAFETM" breakaway slip bases. The two-bolt slip-bases for u-channel supports were previously accepted by the Federal Highway Administration (FHWA) (See acceptance letter SS- 69 dated 9-18-1996). The posts are 6 kg/m (4 pound-per-foot) u-channel sign supports of steel conforming to re-rolled rail steel specifications. Each test article consisted of the breakaway post, aluminum warning sign, aluminum battery cabinet/battery/controller, double head flasher, and 80 watt solar panel. The height to the top of the signpost was 4775-mm. The angled solar panel extended slightly above that height.

Testing

A summary of the crash tests of the single square tube posts is presented in the following table.

Test No.	K&K 1	K&K 2
NCHRP 350 Designation	3-60	3-61
Vehicle Mass	798 kg	
Vehicle Impact Speed	36.4 km/hr	101.3 km/hr
Soil Type	Standard, or "Strong" soil	
Impact Angle	0 degrees	
Test Article Mass	87.1 kg	
Occupant Impact Speed	0.9 m/s	0.5 m/s
Vehicle Velocity Change	0.9 m/s	0.6 m/s
Windshield Damage	No contact	No contact
Vehicle Deformation	Shallow dent in bumper	Dents in bumper and hood
Stub Height	100 mm	100 mm

Findings

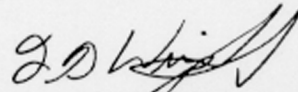
The tested supports met the change in velocity and stub height requirements of the AASHTO Standard Specifications and NCHRP Report 350. There were no deformations of the passenger compartment and no damage to the windshield. Therefore, this K&K Systems Model 112 Solar Panel Sign Support on Marion Steel slip-base supports are acceptable for use on the NHS within the range of conditions tested, when requested by a State. Because the supports were tested in standard soil and there was little or no motion of the stubs in the soil as a result of the test, this breakaway support will also be acceptable when placed in a concrete foundation in standard soil.

You also requested that we find other combinations of solar panel, lights, battery box, splices, and timers acceptable according to the chart shown as Enclosure 2. All K&K Models are lighter in weight except for systems CT 117 and CT 118. These heaviest systems are approximately 50 percent heavier than the tested model. Calculations supplied by Joe Mayer of SWRI show that the projected occupant impact velocity for the worst-case 100 km/hr impact would only be 1.97 m/s. This is still under the "desirable" limit of 3 m/s in NCHRP Report 350. Based upon this calculation and the successful crash tests we will consider any configuration of your company's Solar Panel Sign Supports on Marion Steel slip-base supports using 6 kg/m u-channel posts acceptable provided the total mass is 135 kg or less and the center of gravity of the assembly is no lower than the tested system.

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 SS-90, shall not be reproduced except in full.
- K&K Systems Solar Panel Sign Supports are patented products and 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

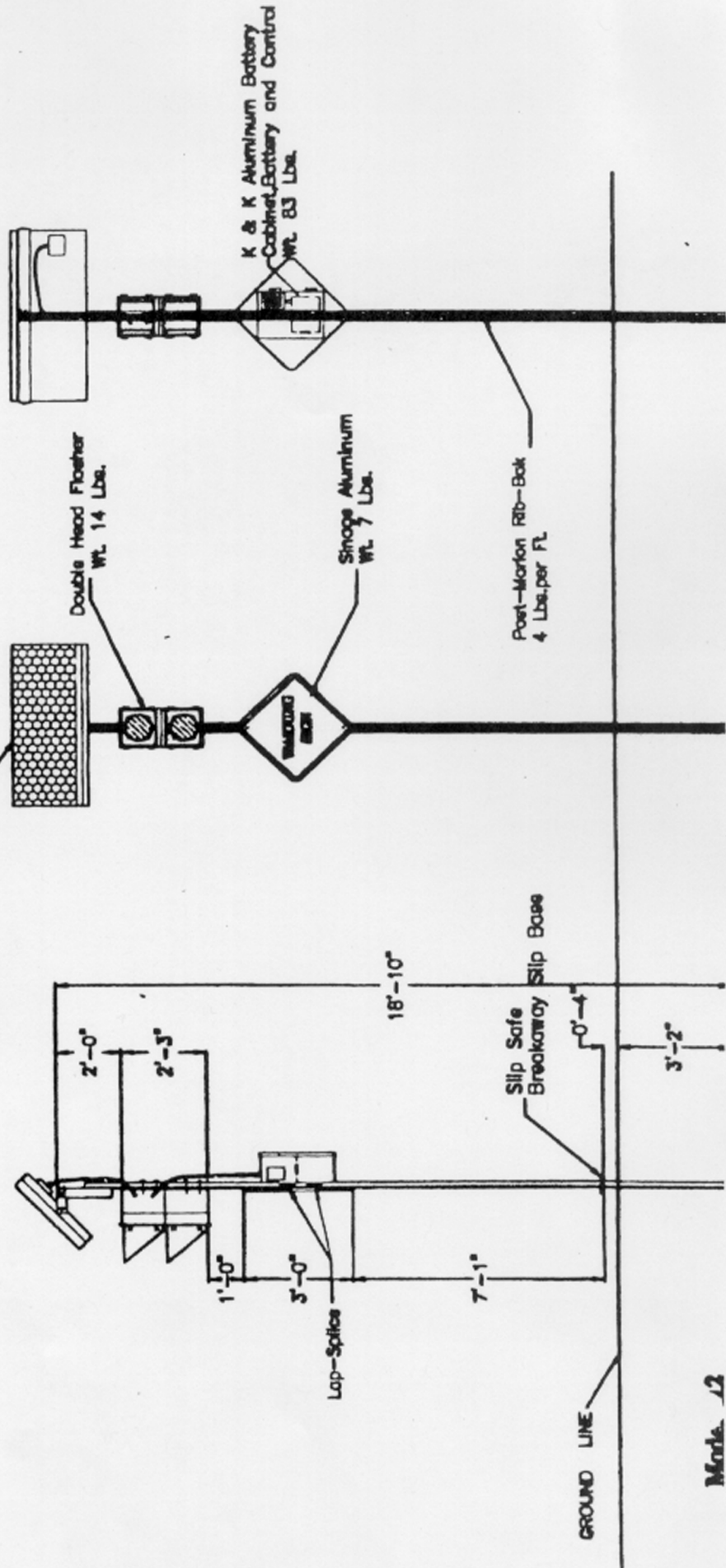
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cc: Chron 3407, Reader 3407.
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K and K Systems, Inc.

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TUPELO, MS 38801

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FAX (662)566-7123
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Solar Panel and Mounting Bracket
80 Watts
Wt. 27 Lbs.
Dimensions 57" x 20" x 2"



K & K SYSTEMS, INC.
TUPELO, MISSISSIPPI 38801
NCHRP 350 TESTED.....
ACCEPTED.....CERTIFIED

MODEL	SOLAR	LED'S	BATTERY BOX	SPLICERS	BREAK AWAY	TIMER	SYSTEM WEIGHT
CT 112	80 WATT	2-12"	SINGLE	2	1	1	192 lbs. Tested
CT 103 & CT 104	32 WATT	8"	SINGLE	2	1	NA	169 lbs. -23
CT 105 & CT 106	50 WATT	8"	SINGLE	2	1	NA	176 lbs. -16
CT 110	50 WATT	2-8"	SINGLE	2	1	1	182 lbs. -10
CT 113 & CT 114	80 WATT	2-8"	SINGLE	2	1	NA	187 lbs. -5
CT 115 & CT 116	80 WATT	12"	SINGLE	2	1	NA	184 lbs. -8
CT 117 & CT 118	2-80 WATT	2-12"	DOUBLE	3	1	NA	290 lbs. +98
CT 120	32 WATT	2-8"	SINGLE	2	1	1	174 lbs. -18
CT 122	50 WATT	2-12"	SINGLE	2	1	1	185 lbs. -7
CT 124	50 WATT	2-8"	SINGLE	2	1	1	181 lbs. -11

K & K Systems, Inc.
SUMMARY

All above systems use identical breakaways located 4" above ground level, lap splices, solar mounting configuration welded to 4 lb/ft steel "U" channel poles, battery cabinets and wiring. The signage or bottom LED is always mounted 7 foot above ground level, which puts majority of weight of system above the oncoming vehicle. Respectfully submit that all above systems be certified NCHRP 350 approved.

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