



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

1200 New Jersey Ave., SE
Washington, D.C. 20590

April 15, 2016

In Reply Refer To:
HSST-1/SS-180

Mr. Greg Kirchgesner
Xcessories Squared
P.O. Box 135
Auburn, IL 62615

Dear Mr. Kirchgesner:

This letter is in response to your January 26, 2016 request for the Federal Highway Administration (FHWA) to review a roadside safety device, hardware, or system for eligibility for reimbursement under the Federal-aid highway program. This FHWA letter of eligibility is assigned FHWA control number SS-180 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

Decision

The following devices are eligible, with details provided in the form which is attached as an integral part of this letter:

- MASSH-400 Sign Support

Scope of this Letter

To be found eligible for Federal-aid funding, new roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH). However, the FHWA, the Department of Transportation, and the United States Government do not regulate the manufacture of roadside safety devices. Eligibility for reimbursement under the Federal-aid highway program does not establish approval, certification or endorsement of the device for any particular purpose or use.

This letter is not a determination by the FHWA, the Department of Transportation, or the United States Government that a vehicle crash involving the device will result in any particular outcome, nor is it a guarantee of the in-service performance of this device. Proper manufacturing, installation, and maintenance are required in order for this device to function as tested.

This finding of eligibility is limited to the crashworthiness of the system and does not cover other structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

Eligibility for Reimbursement

Based solely on a review of crash test results and certifications submitted by the manufacturer, and the crash test laboratory, FHWA agrees that the device described herein meets the crash test and evaluation criteria of the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH). Therefore, the device is eligible for reimbursement under the Federal-aid highway program if installed under the range of tested conditions.

Name of system: MASSH-400 Sign Support
Type of system: Sign Support
Test Level: MASH TL-3
Testing conducted by: TTI
Task Force 13 Designator:
Date of request: January 26, 2016
Date initially acknowledged: March 15, 2016
Date of completed package: March 28, 2016

FHWA concurs with the recommendation of the accredited crash testing laboratory as stated within the attached form.

Full Description of the Eligible Device

The device and supporting documentation, including reports of the crash tests or other testing done, videos of any crash testing, and/or drawings of the device, are described in the attached form.

Notice

If a manufacturer makes any modification to any of their roadside safety hardware that has an existing eligibility letter from FHWA, the manufacturer must notify FHWA of such modification with a request for continued eligibility for reimbursement. The notice of all modifications to a device must be accompanied by:

- Significant modifications – For these modifications, crash test results must be submitted with accompanying documentation and videos.
- Non-signification modifications – For these modifications, a statement from the crash test laboratory on the potential effect of the modification on the ability of the device to meet the relevant crash test criteria.

FHWA's determination of continued eligibility for the modified hardware will be based on whether the modified hardware will continue to meet the relevant crash test criteria.

You are expected to supply potential users with sufficient information on design, installation and maintenance requirements to ensure proper performance.

You are expected to certify to potential users that the hardware furnished has the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the test and evaluation criteria of the MASH.

Issuance of this letter does not convey property rights of any sort or any exclusive privilege. This letter is based on the premise that information and reports submitted by you are accurate and correct. We reserve the right to modify or revoke this letter if: (1) there are any inaccuracies in the information submitted in support of your request for this letter, (2) the qualification testing was flawed, (3) in-service performance or other information reveals safety problems, (4) the system is significantly different from the version that was crash tested, or (5) any other information indicates that the letter was issued in error or otherwise does not reflect full and complete information about the crashworthiness of the system.

Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number SS-180 shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed upon request.
- This letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.
- If the subject device is a patented product it may be considered to be proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the 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.

Sincerely yours,



Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	March 29, 2016	<input type="radio"/> New <input checked="" type="radio"/> Resubmission
	Name:	Greg Kirchgesner	
	Company:	Xcessories Squared and Allied Tube & Conduit	
	Address:	P.O. Box 135 Auburn, IL and 16100 South Lathrop Ave. Harvey, IL 60426	
	Country:	USA	
	To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies	

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'SS': Breakaway Sign Supports, Mailboxes, & other small sign supports	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	MASSH-400	AASHTO MASH	TL3

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

Identification of the individual or organization responsible for the product:

Contact Name:	Greg Kirchgesner	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Xcessories Squared and Allied Tube & Conduit	Same as Submitter <input checked="" type="checkbox"/>
Address:	P.O. Box 135 Auburn, IL and 16100 South Lathrop Ave. Harvey, IL	Same as Submitter <input checked="" type="checkbox"/>
Country:	USA	Same as Submitter <input checked="" type="checkbox"/>

Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

No ongoing financial interests exist between the testing facility and the manufacturing companies. The only financial occurrence was the contract testing fee for the required MASH testing.

PRODUCT DESCRIPTION

<input checked="" type="radio"/> New Hardware or Significant Modification	<input type="radio"/> Modification to Existing Hardware
<p>The MASSH-400 is a Multi-directionally Activated Sign Support Hardware system for 4" square sign posts. The system includes a 13" triangular slip base, an omni-directional hinge just beneath the sign panel, a 4" x minimum 8ga steel sign post and stainless steel clamps to hold the sign.</p>	

CRASH TESTING

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-60 (1100C)	<p>TTI test report No. 690900-XSD1-3 provides details and results of this test ran as crash test no. 690900-XSD1. The 1100C vehicle used in this test was a 2009 Kia Rio weighing 2435 lbs. The impact speed was 19.5 mph and the impact angle was 0 degrees. The impact point was the right quarter-point of the vehicle aligned with the centerline of the left sign support. The MASSH-400 slip base readily activated and released the impacted support post from its foundation. The sign panel and released support rotated about the hinge assembly on the opposite support post, thus rotating away from the vehicle. The sign support did not penetrate or show potential for penetrating the occupant compartment, or to present undue hazard to others in the area. No occupant compartment deformation or intrusion occurred. The 1100C remained upright during and after the collision event. Maximum roll and pitch angles were each 2 degrees. Occupant risk factors were within the preferred limit specified in MASH. The 1100C vehicle came to rest behind the sign support system 75 ft. from the point of impact.</p>	PASS
3-61 (1100C)	<p>TTI test report No. 690900-XSD1-3 provides details and results of this test ran as crash test no. 690900-XSD2. The 1100C vehicle used in this test was a 2009 Kia Rio weighing 2435 lbs. The impact speed was 61.7 mph and the impact angle was 0 degrees. The impact point was the right quarter-point of the vehicle aligned with the centerline of the left sign support. The MASSH-400 slip base readily activated and the hinge assembly on the impacted post activated as designed. The sign panel twisted, rotated about the hinge assembly on the opposite support, and then detached from the support. The sign support did not penetrate or show potential for penetrating the occupant compartment, or to present undue hazard to others. No occupant compartment deformation or intrusion occurred. The 1100C remained upright during and after the collision event. Maximum roll and pitch angles were each 2 degrees. Occupant risk factors were within the preferred limit specified in MASH. The 1100C vehicle came to rest behind the sign support system 286 ft. from the point of impact.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
3-62 (2270P)	TTI test report No. 690900-XSD1-3 provides details and results of this test ran as crash test no. 690900-XSD3. The 2270P vehicle used in this test was a 2010 Dodge Ram weighing 5006 lbs. The impact speed was 63.1 mph and the impact angle was 0 degrees. The impact point was the right quarter-point of the vehicle aligned with the centerline of the left sign support. The MASSH-400 slip base readily activated and the hinge assembly activated as designed. The sign panel twisted and rotated about the hinge assembly on the opposite support. The impacted sign support and top two sections of the sign panel detached from the sign panel and, subsequently, the remaining sign panel sections and upper portion of the support on the opposite side of impact detached from the lower support at the hinge point. The detached pieces did not penetrate or show potential for penetrating the occupant compartment, or to present undue hazard to others in the area. No occupant compartment deformation or intrusion occurred. The 2270P remained upright during and after the collision event. Maximum roll and pitch angles were 1 and 2 degrees, respectively. Occupant risk factors were within the preferred limit specified in MASH. The 2270P vehicle came to rest behind the sign support system 320 ft. from the point of impact.	PASS

Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

Laboratory Name:	Texas Transportation Institute	
Laboratory Signature:	Bligh, Roger P	Digitally signed by Bligh, Roger P DN: postalCode=77843, o=TAMU SIGN, street=Texas A&M University, st=TX, l=College Station, c=US, cn=Bligh, Roger P, email=rbligh@tamu.edu Date: 2016.03.29 09:32:56 -05'00'
Address:	Texas A&M Transportation Institute 3135 TAMU College Station, TX 77843-3135	Same as Submitter <input type="checkbox"/>
Country:	U.S.A.	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	A2LA Certificate Number 2821.01 valid until April 30, 2017	

Submitter Signature* Gregory
Kirchgesner

Digitally signed by Gregory Kirchgesner
DN: cn=Gregory Kirchgesner, o=Texas A&M University, ou=Engineering, email=gkirchgesner@tamu.edu, c=US
Date: 2016.03.29 09:44:54 -05'00'

Submit Form

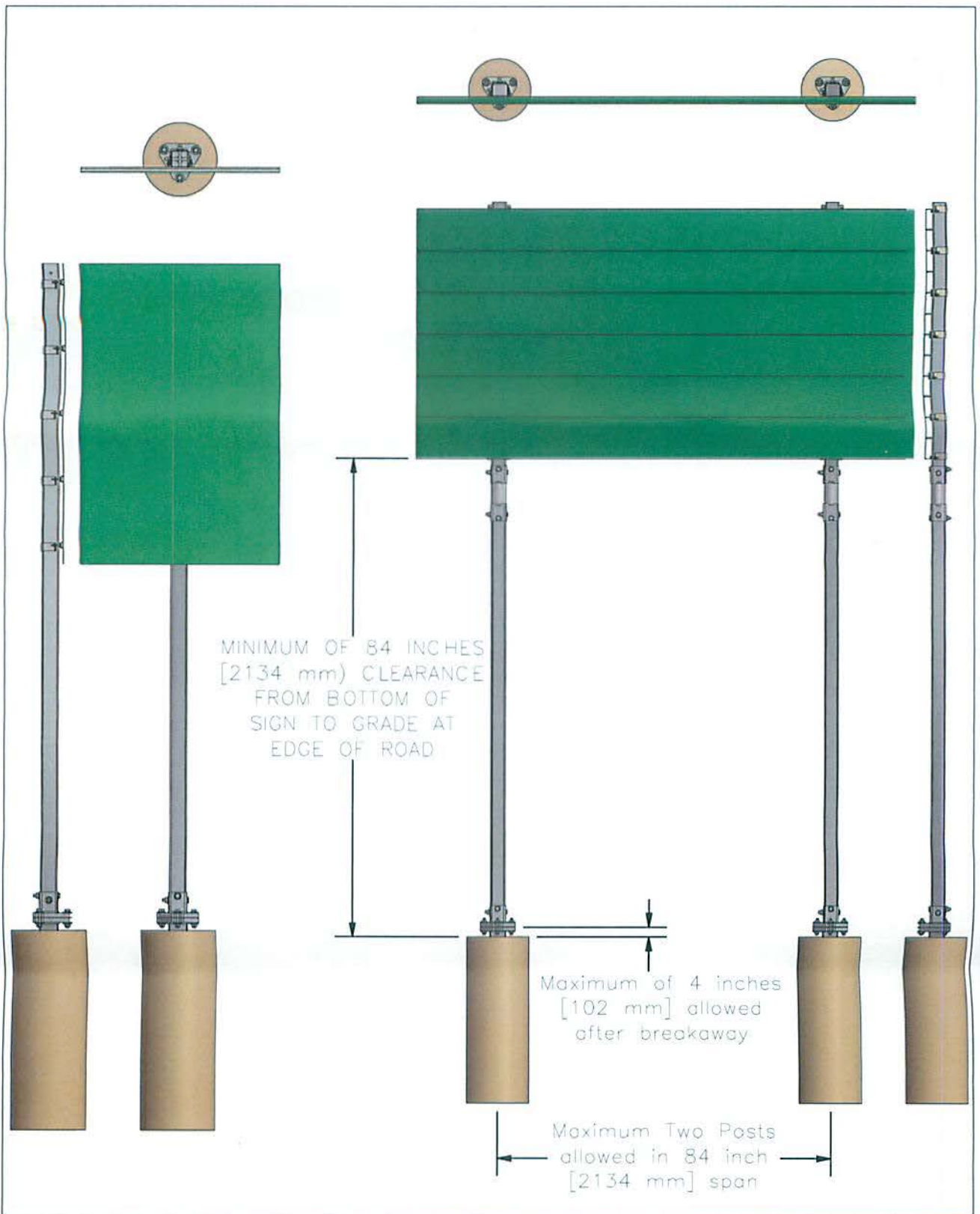
ATTACHMENTS

Attach to this form:

- 1) Additional disclosures of related financial interest as indicated above.
- 2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [[Hardware Guide Drawing Standards](#)]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

Eligibility Letter		AASHTO TF13	
Number	Date	Designator	Key Words
SS-180			sign support



Multi-directionally Activated Sign Support Hardware System



SSS__a-b	
SHEET NO.	DATE
1 of 3	11/1/15

INTENDED USE

The Xcessories Squared and Allied Tube & Conduit Multi-directionally Activated Sign Support Hardware System may be used in place of many sign assembly installations that would typically use beam posts. The system is unique because it contains an Xcessories Squared omni-directional slip base assembly and omni-directional hinge assembly. It is designed to hold an Allied Tube 4" x minimum 8ga solid wall square steel post. When properly installed, the clamping force of the slip base hardware holds the slip base top half to the slip base bottom half to meet or exceed the wind load capability of the sign support, while still allowing the two matching slip plates to disengage upon impact, below the maximum Change of Velocity allowed under MASH TL3 requirements. For multiple post installations, a sign post hinge assembly attaches between the bottom sign post and top sign post, just beneath the sign panel, and allows the bottom post to bend/pivot out of the way of an impacting vehicle.

Product can be used for multiple post installations (up to two in an 84 inch [2134 mm] span) when required to meet MASH TL3 break away requirements.

COMPONENTS

The Xcessories Squared and Allied Tube & Conduit Multi-directionally Activated Sign Support Hardware System consists of a triangular slip base bottom anchor, slip base match plate hardware, a triangular slip base sign post receiver, a multi-directionally activated sign hinge assembly, and sign panel bracket assemblies to hold sign panels all from Xcessories Squared, and solid wall square steel sign posts from Allied Tube & Conduit. The unibase anchor installs into a concrete footer. The bottom sign post and top sign post attaches to the sign post hinge using structural threaded bolts, washers, and nuts.

- A Slip Base Match Plate Hardware Set
- B Slip Base Top - Sign Post Receiver
- C Uni-Base Anchor for concrete installation
- D Multi-directionally Activated Sign Hinge Assembly
- E Sign Panel Bracket Assembly
- F Sign Post Hardware Set
- G Sign Post Cap
- H Square Sign Post

APPROVALS

FHWA Eligibility Letter SS-___, 2016.

CONTACT INFORMATION

Xcessories Squared Development & Mfg., Inc.
P.O. Box 135
Auburn, IL 62615
800-621-7948
www.x-sqrd.com

Allied Tube & Conduit
16100 South Lathrop Avenue
Harvey, IL 60426
800-882-5543
www.atkore.com

Multi-directionally Activated Sign Support Hardware System

SSS__a-b

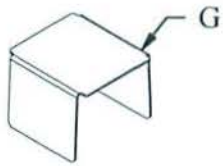
SHEET NO.

DATE

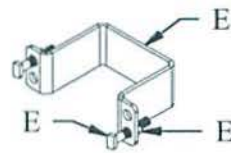
2 of 3

11/1/15

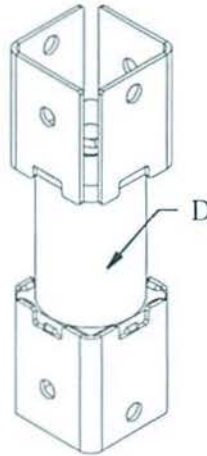




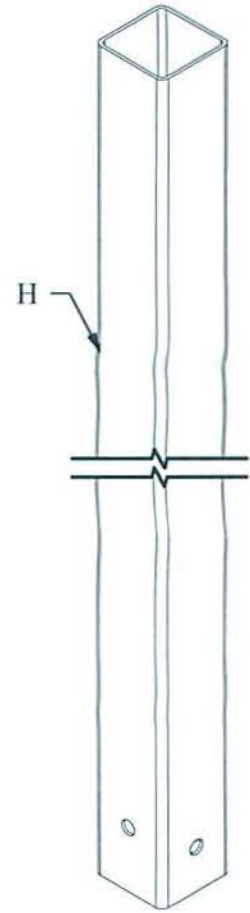
Sign Post Cap



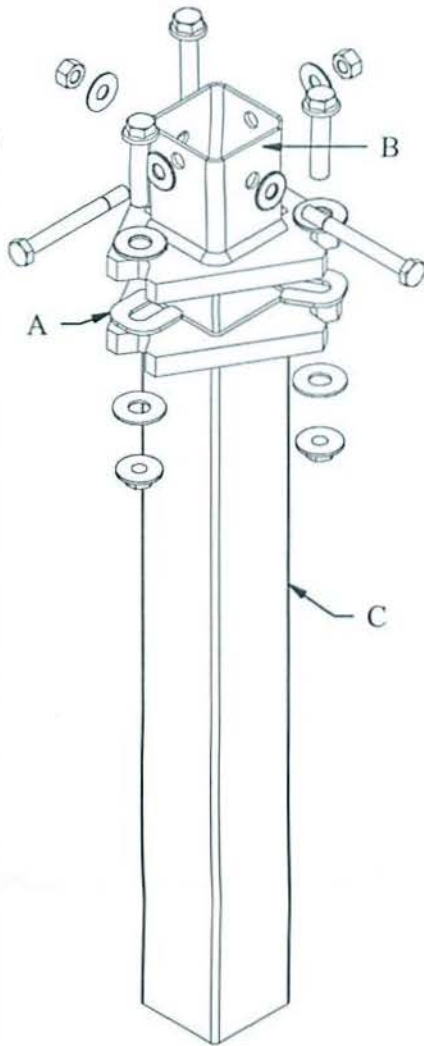
Sign Panel
Clamp Set



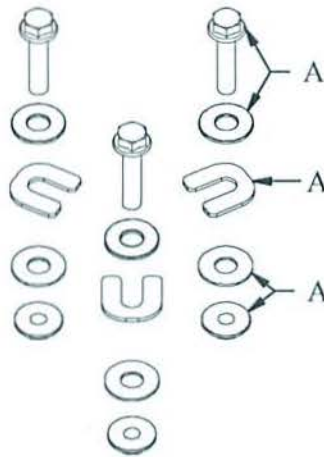
Multi-directionally
Activated
Sign
Support
Hinge



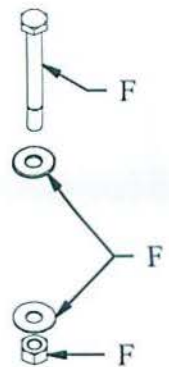
Square Sign Post



Complete Slip Base
Assembly for
Concrete Installation



Slip Base Match
Plate Hardware Set



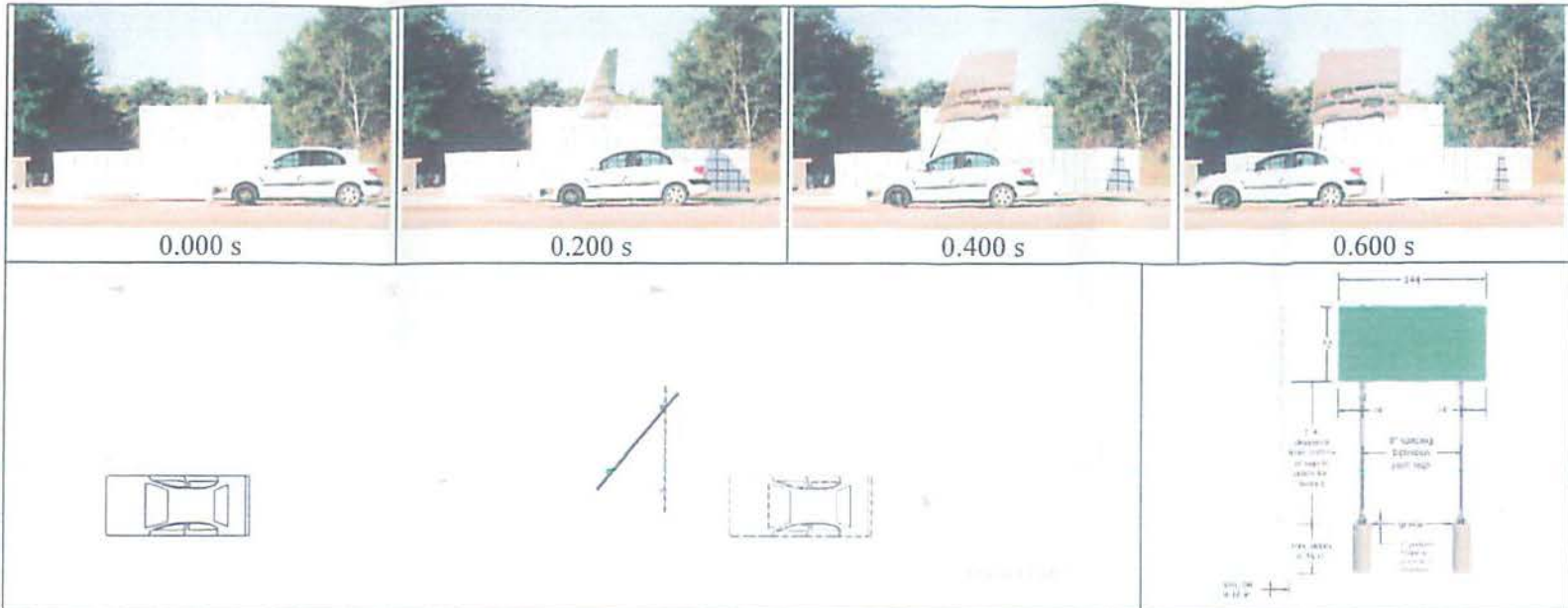
Sign Post
Hardware Set

Multi-directionally Activated Sign Support Hardware System



SSS__a-b

SHEET NO.	DATE
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General Information

Test Agency..... Texas Transportation Institute (TTI)
 Test Standard Test No..... MASH Test 3-60
 TTI Test No. 690900-XSD1
 Test Date 2015-10-28

Test Article

Type Sign Support
 Name..... MASSH-400 Sign System
 Installation Height 7 ft 4 inches to bottom of sign panel
 Material or Key Elements Two 4-inch square steel posts spaced at 8 ft w/12-ft wide x 6 ft tall sign panel

Soil Type and Condition

..... Drilled shaft foundation in AASHTO M147-65(2004) Grade B Soil

Test Vehicle

Type/Designation..... 1100C
 Make and Model 2009 Kia Rio
 Curb 2480 lb
 Test Inertial..... 2435 lb
 Dummy 165 lb
 Gross Static 2600 lb

Impact Conditions

Speed 19.5 mi/h
 Angle 0 degree
 Location/Orientation..... Right qtr-pt w/CL left support

Kinetic Energy

..... 31 kip-ft

Occupant Risk Values

Longitudinal OIV 3.3 ft/s
 Lateral OIV 1.6 ft/s
 Longitudinal Ridedown 0.2 g
 Lateral Ridedown 0.3 g
 THIV 4.1 km/h
 PHD 0.3 g
 ASI 0.09
 Max. 0.050-s Average
 Longitudinal -0.7 g
 Lateral 0.3 g
 Vertical -0.3 g

Exit Conditions

Speed 16.8 mi/h
 Angle 0 degree

Post-Impact Trajectory

Stopping Distance 75 ft

Vehicle Stability

Maximum Yaw Angle 1 degree
 Maximum Pitch Angle 2 degrees
 Maximum Roll Angle 2 degrees

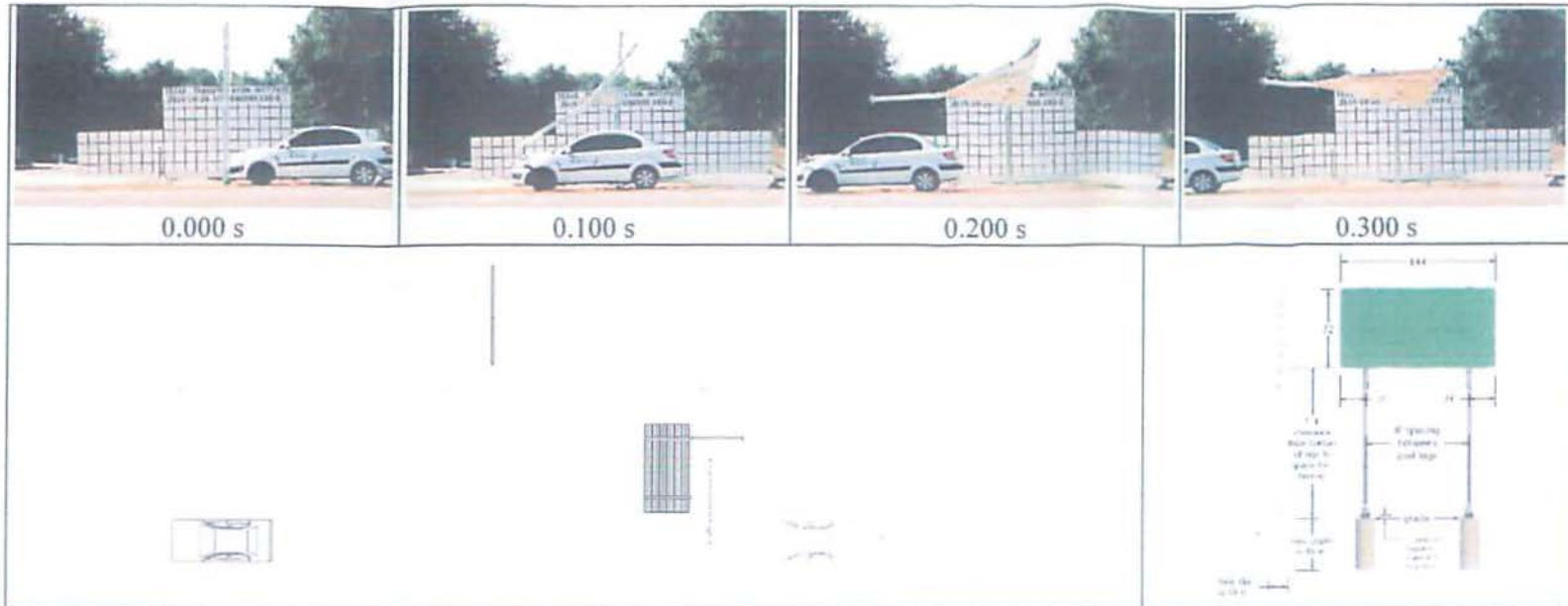
Test Article Debris Scatter

Longitudinal 10 ft
 Lateral 12 ft

Vehicle Damage

VDS 12FR1
 CDC 12FREN1
 Max. Exterior Deformation..... Not measureable
 OCDI RF0000000
 Max. Occupant Compartment Deformation None

Figure 5.5. Summary of Results for MASH Test 3-60 on the Allied Tube and Conduit® and Xcessories Squared MASSH-400 Sign Support.



General Information

Test Agency..... Texas Transportation Institute (TTI)
 Test Standard Test No..... MASH Test 3-61
 TTI Test No. 690900-XSD2
 Test Date..... 2015-10-28

Test Article

Type Sign Support
 Name..... MASSH-400 Sign System
 Installation Height 7 ft 4 inches to bottom of sign panel
 Material or Key Elements Two 4-inch square steel posts spaced at 8 ft w/12-ft wide x 6 ft tall sign panel

Soil Type and Condition

..... Drilled shaft foundation in AASHTO M147-65(2004) Grade B Soil

Test Vehicle

Type/Designation..... 1100C
 Make and Model 2009 Kia Rio
 Curb..... 2480 lb
 Test Inertial..... 2435 lb
 Dummy 165 lb
 Gross Static..... 2600 lb

Impact Conditions

Speed61.7 mi/h
 Angle0 degree
 Location/Orientation

Kinetic Energy310 kip*ft

Occupant Risk Values

Longitudinal OIV3.3 ft/s
 Lateral OIV.....0.7 ft/s
 Longitudinal Ridedown0.2 g
 Lateral Ridedown0.6 g
 THIV3.9 km/h
 PHD.....0.6 g
 ASI.....0.21
 Max. 0.050-s Average
 Longitudinal-1.9 g
 Lateral.....-0.6 g
 Vertical.....0.6 g

Exit Conditions

Speed 60.4 mi/h
 Angle 0 degree

Post-Impact Trajectory

Stopping Distance.....286 ft

Vehicle Stability

Maximum Yaw Angle2 degrees
 Maximum Pitch Angle2 degrees
 Maximum Roll Angle2 degrees

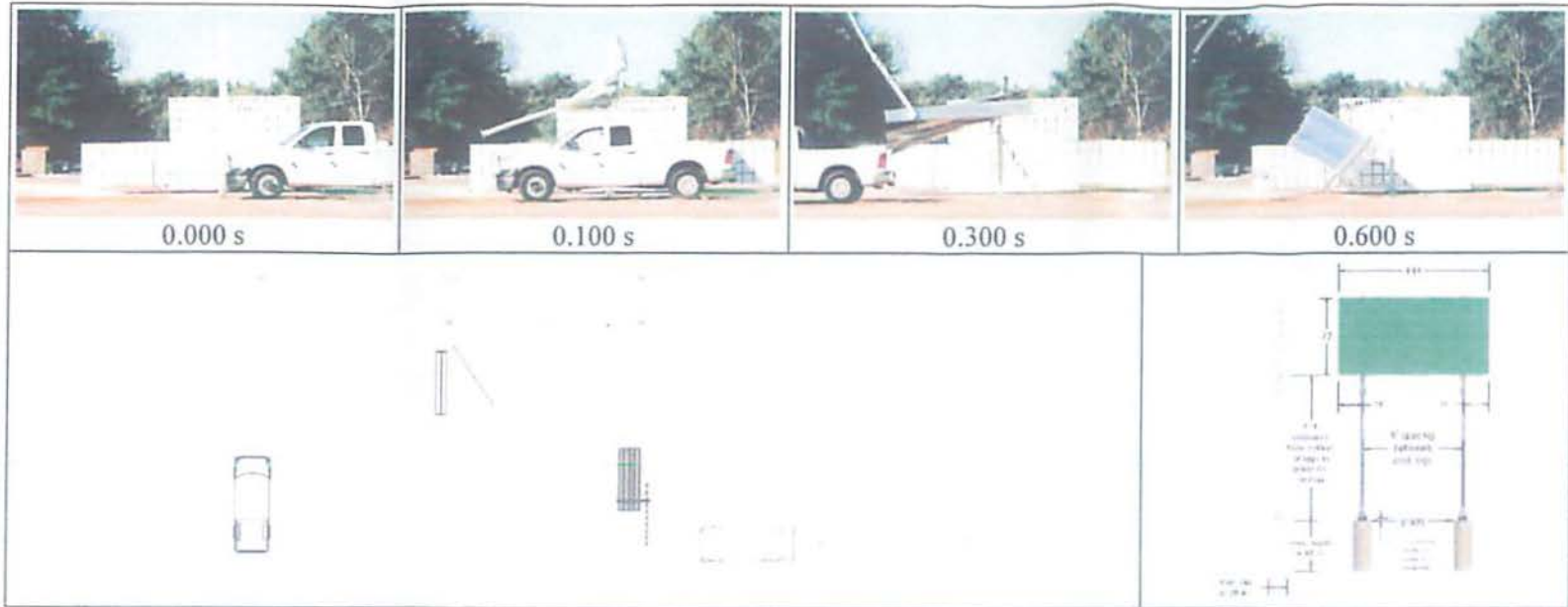
Test Article Debris Scatter

Longitudinal6 ft
 Lateral.....16 ft

Vehicle Damage

VDS 12FR1
 CDC..... 12FREN1
 Max. Exterior Deformation..... 1.5 inches
 OCDI..... RF0000000
 Max. Occupant Compartment
 DeformationNone

Figure 6.6. Summary of Results for MASH Test 3-61 on the Allied Tube and Conduit® and Xcessories Squared MASSH-400 Sign Support.



General Information

Test Agency Texas Transportation Institute (TTI)
 Test Standard Test No. MASH Test 3-62
 TTI Test No. 690900-XSD3
 Test Date 2015-10-29

Test Article

Type Sign Support
 Name MASSH-400 Sign System
 Installation Height 7 ft 4 inches to bottom of sign panel
 Material or Key Elements Two 4-inch square steel posts spaced at 8 ft w/12-ft wide x 6 ft tall sign panel

Soil Type and Condition

..... Drilled shaft foundation in AASHTO M147-65(2004) Grade B Soil

Test Vehicle

Type/Designation 2270P
 Make and Model 2010 Dodge Ram 1500 Pickup
 Curb 5242 lb
 Test Inertial 5006 lb
 Dummy No dummy
 Gross Static 5006 lb

Impact Conditions

Speed 63.1 mi/h
 Angle 0 degree
 Location/Orientation Rt qtr-pt w/CL left support

Kinetic Energy

..... 666 kip*ft

Occupant Risk Values

Longitudinal OIV 1.6 ft/s
 Lateral OIV 2.6 ft/s
 Longitudinal RDA 0.1 g
 Lateral RDA 0.5 g
 THIV 3.8 km/h
 PHD 0.5 g
 ASI 0.18

Max. 0.050-s Average

Longitudinal -1.0 g
 Lateral 0.6 g
 Vertical 0.5 g

Exit Conditions

Speed 62.4 mi/h
 Angle 0 degree

Post-Impact Trajectory

Stopping Distance 320 ft

Vehicle Stability

Maximum Yaw Angle 3 degrees
 Maximum Pitch Angle 2 degrees
 Maximum Roll Angle 1 degree

Test Article Debris Scatter

Longitudinal 40 ft
 Lateral 25 ft

Vehicle Damage

VDS 12FR1
 CDC 12FREN1
 Max. Exterior Deformation 2.75 inches
 OCDI RF0000000
 Max. Occupant Compartment Deformation None

Figure 7.6. Summary of Results for MASH Test 3-62 on the Allied Tube and Conduit® and Xcessories SquaredMASSH-400 Sign Support.



Texas A&M Transportation Institute
The Texas A&M University System
3135 TAMU
College Station, TX 77843-3135

979-845-6375
Fax: 979-845-6107
<http://tti.tamu.edu>

March 28, 2016

Mr. Greg Kirchgerner
Accessories Squared
7350 W. St. Rt. 104
Auburn, IL 62615

Dear Greg,

I understand that FHWA has requested an engineering basis for why a slightly higher vehicle hood height would not be critical for the evaluation of your new sign support system.

In these tests, first contact is with the bumper of the vehicle, which extends out beyond the hood. The slip base releases at the base of the support and the support rotates up and away from the front of the vehicle as a rigid body about the upper hinge or sign panel. The hood is not involved in the impact sequence and a small variation in hood height would not affect the impact performance of the sign support system. The system worked equally well with the pickup truck, which has a much taller hood height.

I hope this addresses the question. Please let me know if there are any further questions.

Sincerely,

A handwritten signature in blue ink that reads "Roger Bligh". The signature is written in a cursive, flowing style.

Roger P. Bligh, Ph.D., P.E.
Senior Research Engineer
Manager, Roadside Safety Program