



U.S. Department
of Transportation

**Federal Highway
Administration**

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

September 28, 2016

In Reply Refer To:
HSST-WZ-337

Mr. Brett Yuhas
Airstar America Lighting, Inc.
4544 W. Russell Road
Las Vegas, Nevada 89118

Dear Mr. Yuhas:

This letter is in response to your July 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 WZ-337 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:

- Airstar Space Globe Lighting Stand

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' 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:	Airstar Space Globe Lighting Stand
Type of system:	Work zone lighting
Test Level:	MASH Test Level 3 (TL3)
Testing conducted by:	Texas A&M Transportation Institute
Date of request:	July 26, 2016

FHWA concurs with the recommendation of the accredited crash testing laboratory as stated within the attached form. Note that the minimum height should be 15 feet from the ground to the bottom of the lighting fixture when installed in locations where it may be impacted by errant vehicles.

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 WZ-337 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,



(For)

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:	July 26, 2016	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Brett Yuhas	
	Company:	Airstar America Lighting, Inc.	
	Address:	4544 W. Russell Road, Las Vegas, NV 89118	
	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.

Device & Testing Criterion - Enter from right to left starting with Test Level

1-1-1

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'WZ': Crash Worthy Work Zone Traffic Control Devices	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	Airstar Space Globe Lighting Stand	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.

Individual or Organization responsible for the product:

Contact Name:	Brett Yuhas	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Airstar America Lighting, Inc.	Same as Submitter <input checked="" type="checkbox"/>
Address:	4544 W. Russell Road, Las Vegas, NV 89118	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.

TTI Proving Ground test lab has no financial interests in the tested barrier. Airstar American Lighting, Inc. contracted for the service of crash testing this barrier according to specifications for American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH) Tests 3-71 and 3-72, for which TTI Proving Ground was compensated for the cost to perform the tests. No consulting relationships, research funding or other forms of research support, patents, copyrights, other intellectual property interests, licenses, contractual relationships, business ownership, or investment interests are retained for the TTI Proving Ground.

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
 Modification to Existing Hardware

15-ft installation: The test installations consisted of a proprietary temporary lighting stand with lighted fabric balloon globes (Sirocco Model 2K HA) as provided by Airstar Space Lighting (ASL).

The light was supported by a telescoping chrome plated steel pole with each of the multiple nested sections joined by aluminum Matthews brand concentric reducing couplers with set screws and bolts. From grade, the bottom section, which was inserted into the tripod receiver tube, was comprised of approximately 26½ inches (exposed) of 1 ¾-inch outer diameter (OD) tubing; the 1st middle section was comprised of approximately 9 inches (exposed) of 1 ½-inch OD tubing; the 2nd middle section was comprised of approximately 54 inches (exposed) of 1¼ inch OD tubing; and the top section was comprised of approximately 65 inches (exposed) of 1-inch OD tubing. The top of the column (at bottom of the balloon globe) was 15 ft-0 inches above grade. The total column assembly weighed 19 lbs.

The cylindrical fabric balloon globe atop the column was approximately 32 inches in diameter and 16 inches tall, although billowing gave it a somewhat rounded shape. The lighting element consisted of two 1000-watt R7S halogen bulbs supported by a protective wire space frame within the balloon. The base of the globe assembly contained a small blower fan to inflate the fabric balloon. A #12 American Wire Gauge (AWG), 3-conductor electrical cable connected the globe to a portable generator power source for the test. The top of the balloon globe was approximately 16 ft 4 inches above grade. The balloon globe and light assembly weighed 9 lb.

The telescoping support was supported by an integral, folding, flat-footed tripod mechanism. Each of the three feet was a 23-inch long × 3-inch wide × ½-inch thick steel strip. Each was attached with a hinge on the bottom end to a 24-inch tall, 2-inch nominal diameter steel pipe tripod receiver tube (2.122 inch OD, 0.093-inch wall thickness). A 13¾-inch long × 1½-inch wide × ¼ inch thick steel strip folding knee brace was pinned (12¼ inches between the pins) to a clip welded to each foot and to a 9½-inch long sliding tube around the 2-inch receiver tube. The tripod base weighed 34 lb.

The complete lighting stand structure (balloon globe, column, base, and tripod) weighed a total of 62 lb. In addition, a single 35-lb sandbag was placed on each tripod foot to hold and stabilize the structure on the runway apron. Thus, the total weight of the tested structure with ballast was 167 lb. The lighting stand structure was oriented such that one foot of the tripod was directly aligned with the impact path of the test vehicle.

CRASH TESTING

By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.

Engineer Name:	Dusty R. Arrington	
Engineer Signature:	Dusty Arrington	Digitally signed by Dusty Arrington DN: cn=Dusty Arrington, o=Texas A and M Transportation Institute, ou=Roadside Safety and Physical Security Division, email=d-arrington@ttl.tamu.edu, c=US Date: 2016.07.28 09:48:34 -05'00'
Address:	3135 TAMU, College Station, TX 77843	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input checked="" type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)	MASH Test 3-70 was not performed, nor required, according to MASH. The Airstar Space Globe Lighting Stand weighed 62 pounds. Therefore and in accordance with the test evaluation criteria presented in the MASH, Test 3-70 was not performed due to its weight being less than 220 lb(110kg).	Non-Critical, not conducted
3-71 (1100C)	TTI Test No. 690900-ASL3; 2016-01-08; Test Report No. 690900-ASL3: The lighting stand was tested and evaluated with a 15 ft to the bottom of the globe light fixture mounting height. The Airstar Space Globe Lighting Stand activated by yielding and slipped out of the base. The vertical section of the light stand separated from the bottom foot plate and rode along with the vehicle for 180 ft. The detached pieces did not penetrate, or show potential to penetrate the occupant compartment, or to present undue hazard to others in the area. No occupant compartment deformation or intrusion occurred. The detached pieces did not block the driver's vision or cause the driver to lose control of the vehicle. The 1100C vehicle remained upright and stable during and after the collision event. Page 35 of MASH states that the vehicle in test 3-71 is not required to be instrumented if the total weight of the test article weighs less than 220 lb (100 kg), and if the product is free standing. The complete lighting stand structure (balloon globe, column, base, and tripod) weighed a total of 62 lb. Therefore, no instrumentation was used in Test No. 690900-ALS3. The 1100C vehicle came to rest 275 ft downstream of impact. No puncture of the fuel tank occurred. PASS	PASS

Required Test Number	Narrative Description	Evaluation Results
3-72 (2270P)	<p>690900-ASL2; 2014-02-28; Test Report No. 690900-ASL1-2: The lighting stand was tested and evaluated with a 12 ft to the bottom of the globe light fixture mounting height. The Airstar Globe Lighting Stand activated by yielding. The column deformed just above the stand, and the fractured column and stand wedged in the undercarriage of the vehicle and rode along under the vehicle. The upper portion of the fractured column and the globe rotated over the vehicle. These elements did not penetrate or show potential for penetrating the occupant compartment, or to present hazard to others in the area. No occupant compartment deformation or intrusion occurred. The detached pieces would not block the driver's vision or cause the driver to lose control of the vehicle. The 2270P vehicle remained upright and stable during and after the collision event. Page 35 of MASH states that tests 3-71 and 3-72 are not required to be instrumented if the total weight of the test article weighs less than 220 lb (100 kg), and if the product is free standing. Therefore, no instrumentation was used on Test No. 690900-ALS2. The 2270P vehicle came to rest 290 ft behind the test article. No puncture of fuel tank occurred. PASS</p> <p>The Airstar Space Globe Lighting Stand performed acceptably in Test 3-72 with a 12 ft mounting height to the bottom of the globe light fixture. Test 3-72 was not repeated at a 15 ft height. Increasing the mounting height of the globe light fixture will result in a respective increase in height of the center of gravity (C.G.) of the installation relative to the point of impact. The higher mounting height places the globe higher and further away from the vehicle occupant compartment upon impact. Additionally, by increasing the mounting height and thus the C.G., this increase in height decreases the rate of rotation and reduces the probability of impacting the top of the automobile. Thus the 12 ft mounting constituted a more conservative impact condition. For this reason Test 3-72 was not repeated at a mounting height of 15 ft.</p>	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 AM Transportation Institute	
Laboratory Signature:	<i>Darrell L. Kuhn</i>	<small>Digitally signed by Darrell L. Kuhn DN: cn=Darrell L. Kuhn, o=Texas AM Transportation Institute, ou=Proving Grounds, email=d.kuhn@ttu.tamu.edu, c=US Date: 2018.07.28 09:52:15 -0500</small>
Address:	3135 TAMU, College Station, TX 77843	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input checked="" type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	A2LA Mechanical Testing Certificate 2821.01 through April 30, 2017	

Submitter Signature*: *[Handwritten Signature]*

Submit Form

Brett R. Lukas

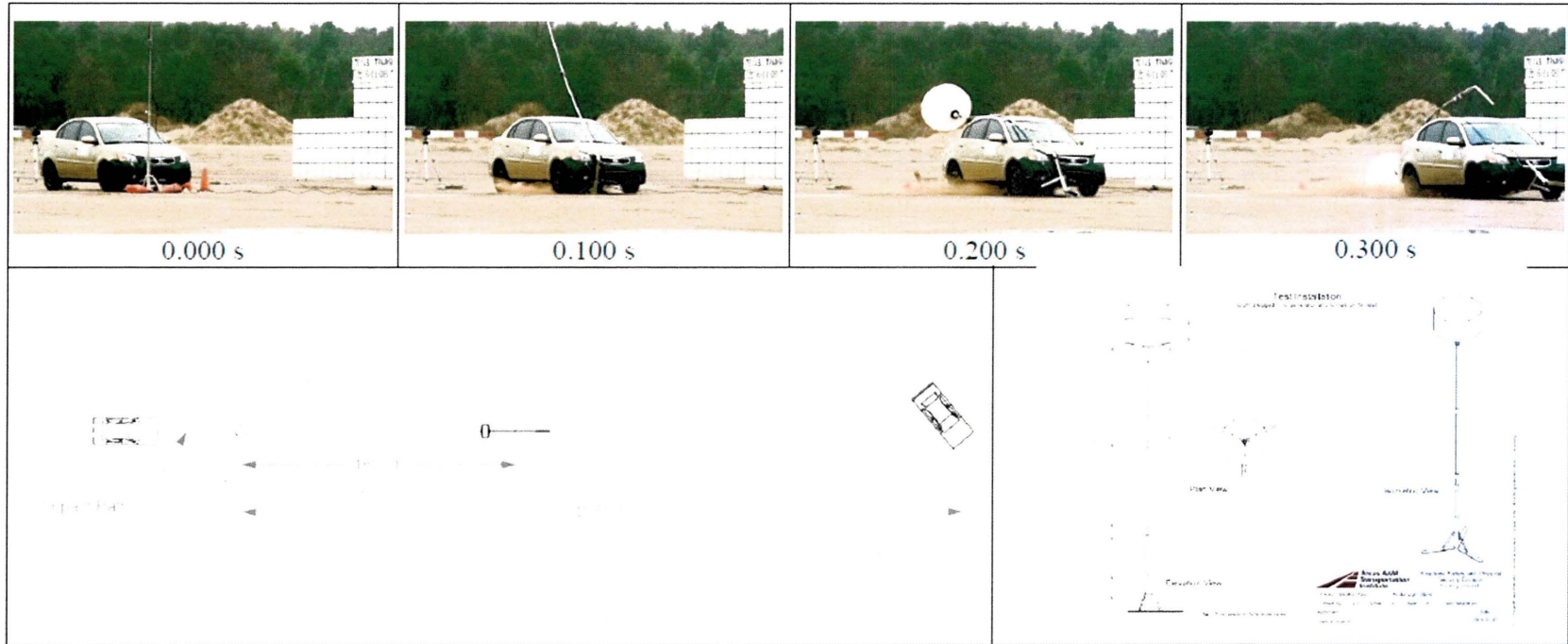
ATTACHMENTS

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		
Number	Date	Key Words



General Information

Test Agency Texas Transportation Institute (TTI)
 Test Standard Test No. MASH Test 3-71
 TTI Test No. 690900-ASL3
 Test Date 2016-01-08

Test Article

Type Work Zone Lighting
 Name Airstar Space Globe Lighting Stand
 Mounting Height 15ft
 Material or Key Elements Proprietary temporary lighting stand with lighted fabric balloon globe (Sirocco Model 2K HA) as provided by Airstar Space Lighting (ASL)

Soil Type and Condition Placed on concrete surface, damp

Test Vehicle

Type/Designation 1100C
 Make and Model 2011 Kia Rio
 Curb 2479 lb
 Test Inertial 2443 lb
 Dummy 165 lb
 Gross Static 2608 lb

Impact Conditions

Speed 61.3 mi/h
 Angle Not Applicable
 Location/Orientation Center of stand to qtr-point of vehicle

Kinetic Energy 307 kip-ft

Exit Conditions

Speed 59.2 mi/h
 Angle Not Applicable

Post-Impact Trajectory

Stopping Distance 275 ft downstream
 2 ft right of center

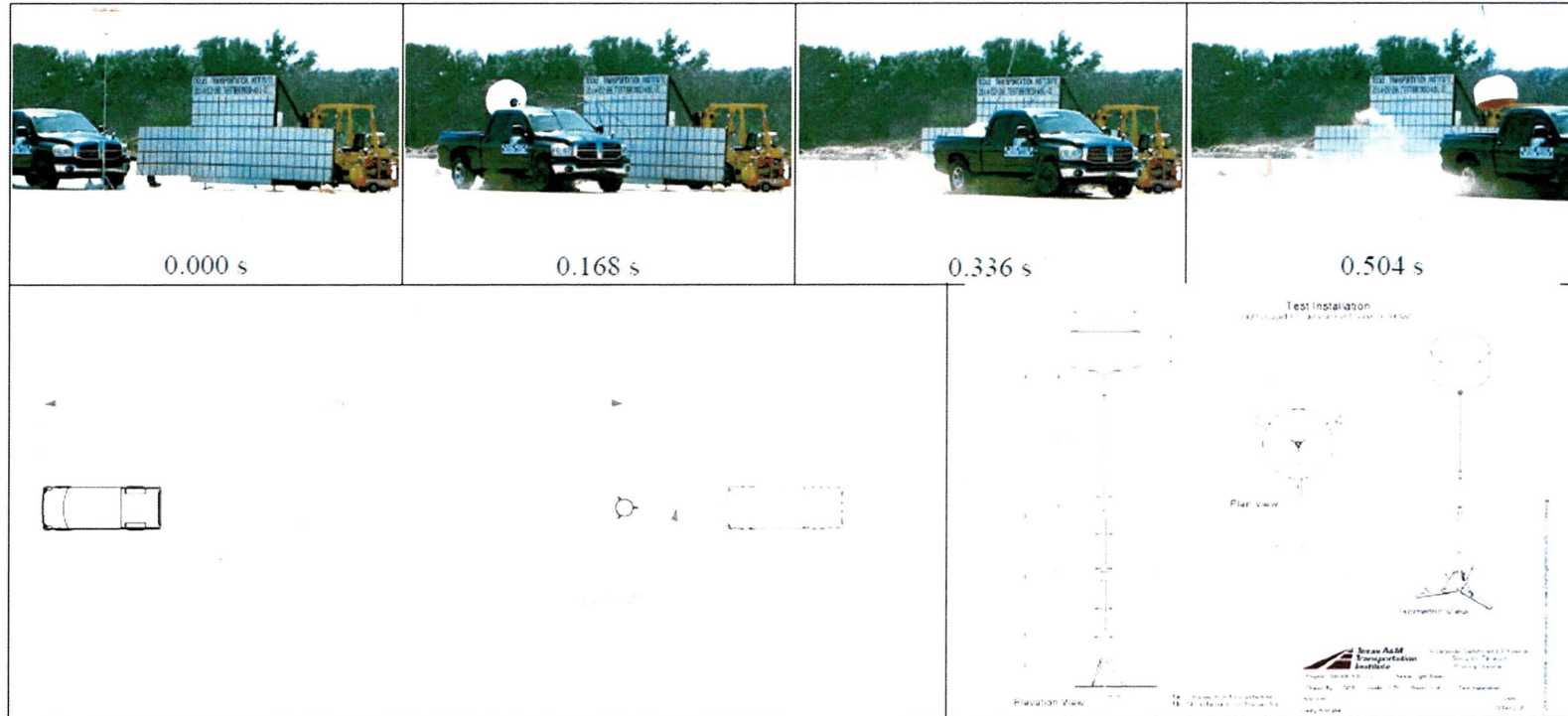
Test Article Debris Scatter

Downstream of Impact 180 ft downstream
 Right Side of Impact 2 ft
 Left Side of Impact 0 ft

Vehicle Damage

VDS 12FR1
 CDC 12FREN1
 Max. Exterior Deformation None measurable
 OCCDI RF0000000
 Max. Occupant Compartment Deformation None

Figure 5.6. Summary of Results for MASH Test 3-71 on the Airstar Space Globe Lighting Stand.



General Information

Test Agency..... Texas A&M Transportation Institute (TTI)
 Test Standard Test No. MASH Test 3-72
 TTI Test No. 690900-ASL2
 Date 2014-02-28

Test Article

Type Work Zone Traffic Device
 Name Airstar Globe Lighting Stand
 Installation Height..... 12 ft to bottom of light globe
 Material or Key Elements

Soil Type and Condition..... Concrete Surface, Dry

Test Vehicle

Type/Designation..... 2270P
 Make and Model..... 2008 Dodge Ram
 Curb 4926 lb
 Test Inertial..... 5061 lb
 Dummy..... No dummy
 Gross Static..... 5061lb

Impact Conditions

Speed..... 61.4 mi/h
 Angle..... 0 degrees
 Location/Orientation Center/Center

Exit Conditions

Speed..... 59.9 mi/h
 Angle..... Not obtainable

Post-Impact Trajectory

Stopping Distance..... 290 ft

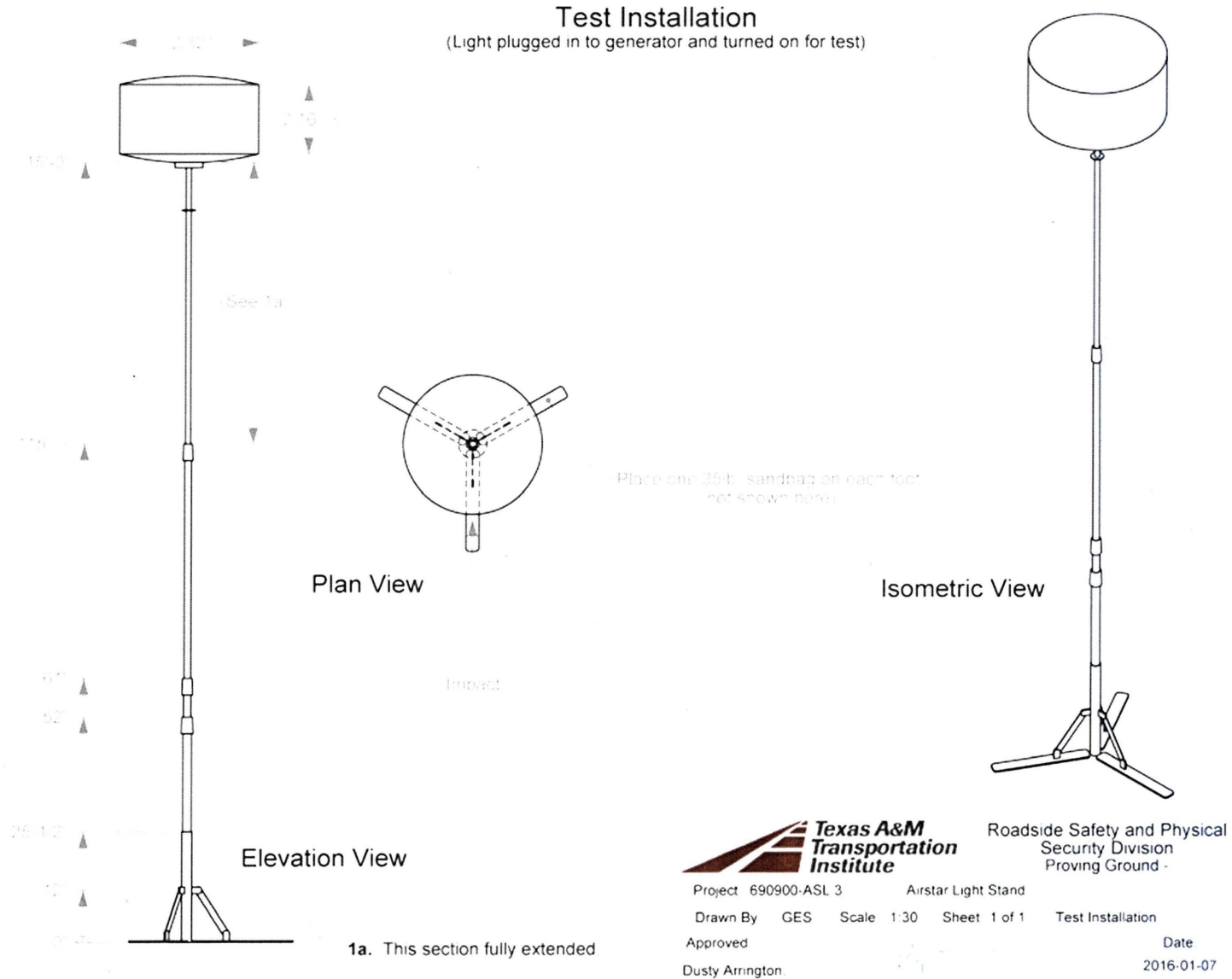
Test Article Debris Scatter

Downstream of impact..... 290 ft
 Right side of impact..... 3 ft
 Left side of impact..... 12.5 ft

Vehicle Damage

VDS..... 12FC1
 CDC..... 12FCEN1
 Max. Exterior Deformation..... 2.0 inches
 OCDI..... FS0000000
 Max. Occupant Compartment Deformation..... None

Figure 6.7. Summary of Results for MASH Test 3-72 on the Airstar Globe Lighting Stand.



T:\1-ProjectFiles\690900-Compliance\ASL-Airstar\ASL3\Drafting\690900-ASL-3 Drawing

Figure 2.1. Details of the Airstar Space Globe Lighting Stand.