



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

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

February 1, 2013

In Reply Refer To:  
HSST/WZ-321

Mr. John Williams  
Roundspring Technologies, Inc.  
8714 West Farm Road 124  
Springfield, Missouri 65802

Dear Mr. Williams:

This letter is in response to your request for the Federal Highway Administration (FHWA) to review a roadside safety system for eligibility for reimbursement under the Federal-aid highway program.

Name of system:	Remote Operated Safety Attendant (ROSA)
Type of system:	Portable Flagger for work zones
Test Level:	MASH Test Level 3
Testing conducted by:	E-TECH Testing Services
Task Force 13 Designator:	TBD
Date of request:	September 4, 2012

**Decision:**

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

- Roundspring Technologies Remote Operated Safety Attendant (ROSA)

Based on a review of crash test results submitted by the manufacturer certifying 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), the device is eligible for reimbursement under the Federal-aid highway program. Eligibility for reimbursement under the Federal-aid highway program does not establish approval or endorsement by the FHWA for any particular purpose or use.

The FHWA, the Department of Transportation, and the United States Government do not endorse products or services and the issuance of a reimbursement eligibility letter is not an endorsement of any product or service.

FHWA:HSST:NArtimovich:sf:x61331:1/29/13  
File: s://directory folder/HSST/ WZ321\_ROSA.docx  
cc: HSST (NArtimovich; BFouch

**Requirements**

To be found eligible for Federal-aid funding, 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).

**Description**

The device and supporting documentation are described in the attached form and documentation. The attached August 27, 2012, letter from John La Turner of E-Tech Testing Services supports waiver of MASH Test 3-72.

**Summary and Standard Provisions**

Therefore, the system described and detailed in the attached form and drawing is eligible for reimbursement and may be used under the range of conditions tested.

Please note the following standard provisions that apply to FHWA eligibility letters:

- This finding of eligibility does not cover other structural features of the systems, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may influence system conformance with MASH will require a new reimbursement eligibility letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals safety problems, or that the system is significantly different from the version that was crash tested, we reserve the right to modify or revoke this letter.
- You are expected to supply potential users with sufficient information on design and installation 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.
- This letter notes the AASHTO/ARTBA/AGC Task Force 13 designator is yet to be determined, as portable / temporary work zone signs are not yet included in the Task Force 13 on-line guides.
- To prevent misunderstanding by others, this letter of eligibility is designated as number WZ-321 and 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 at our office 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. The FHWA does not become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

- The Roundspring Technologies Remote Operated Safety Assistant is a patented product and considered 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



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1200 New Jersey Ave., SE  
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- To prevent misunderstanding by others, this letter of eligibility is designated as number WZ-321 and 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 at our office 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. The FHWA does not become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

- The Roundspring Technologies Remote Operated Safety Assistant is a patented product and considered 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,

A handwritten signature in blue ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large initial "M".

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

Enclosures

## Request for Federal Aid Reimbursement Eligibility Of Highway Safety Hardware

<b>Submitter</b>	<b>Date of Request:</b>	September 4, 2012	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	<b>Name:</b>	John Williams	
	<b>Company:</b>	Roundspring Technologies, Inc.	
	<b>Address:</b>	8714 W. Farm Road 124, Springfield, MO. 65802	
	<b>Country:</b>	USA	
	<b>To:</b>	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.

[Help](#)

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'WZ': Crash Worthy Work Zone	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> FEA & V&V Analysis	Remote Operated Safety Attendant (ROSA)	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:

<b>Contact Name:</b>	John Williams	Same as Submitter <input checked="" type="checkbox"/>
<b>Company Name:</b>	Roundspring Technologies, Inc.	Same as Submitter <input checked="" type="checkbox"/>
<b>Address:</b>	8714 W. Farm Road 124	Same as Submitter <input checked="" type="checkbox"/>
<b>Country:</b>	Springfield, MO. 65802	Same as Submitter <input checked="" type="checkbox"/>

### PRODUCT DESCRIPTION

<b>New Hardware</b>
The Remote Operated Safety Attendant (ROSA) is an automated work zone traffic control device used to regulate, warn, and advise road users to traverse a section of highway or street in the proper manner while keeping work zone personnel out of harms way. ROSA weighs 180lbs., sign height is 86" deployed, 53" storage and transport, and using wireless remote control technology, allows operation with the click of a button safely from the side of the road. ROSA is built with a rechargeable 12VDC, AASHTO compliant retroreflective STOP/SLOW signage, and USDOT LED lights with solid state flashers. With ROSA's dayglow green color and flashing lights, ROSA does not blend into the workzone, giving drivers one more opportunity to STOP or SLOW.

### CRASH TESTING

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)		

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	The Remote Operated Safety Attendant (ROSA) was crash tested with a Kia Rio at 62mph. ROSA readily yielded to the vehicle in a predictable manner with no debris penetrating the occupant compartment or posing any undue hazard to other traffic, pedestrians, or personnel in the work zone. The vehicle compartment was not compromised nor was the drivers vision blocked by either vehicle damage or debris, which would allow the driver to stop the vehicle safely.	PASS
3-72 (2270P)	See August 27, 2012, letter from John LaTurner of E-TECH Testing.	WAIVER REQUES

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:	E-Tech Testing Services, Inc.	
Laboratory Contact:	John LaTurner, P.E.	Same as Submitter <input type="checkbox"/>
Address:	3617B Cincinnati Avenue, Rocklin, CA 95765	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Date:	ISO/IEC 17025-2005 Mechanical #0989-01	

## ATTACHMENTS

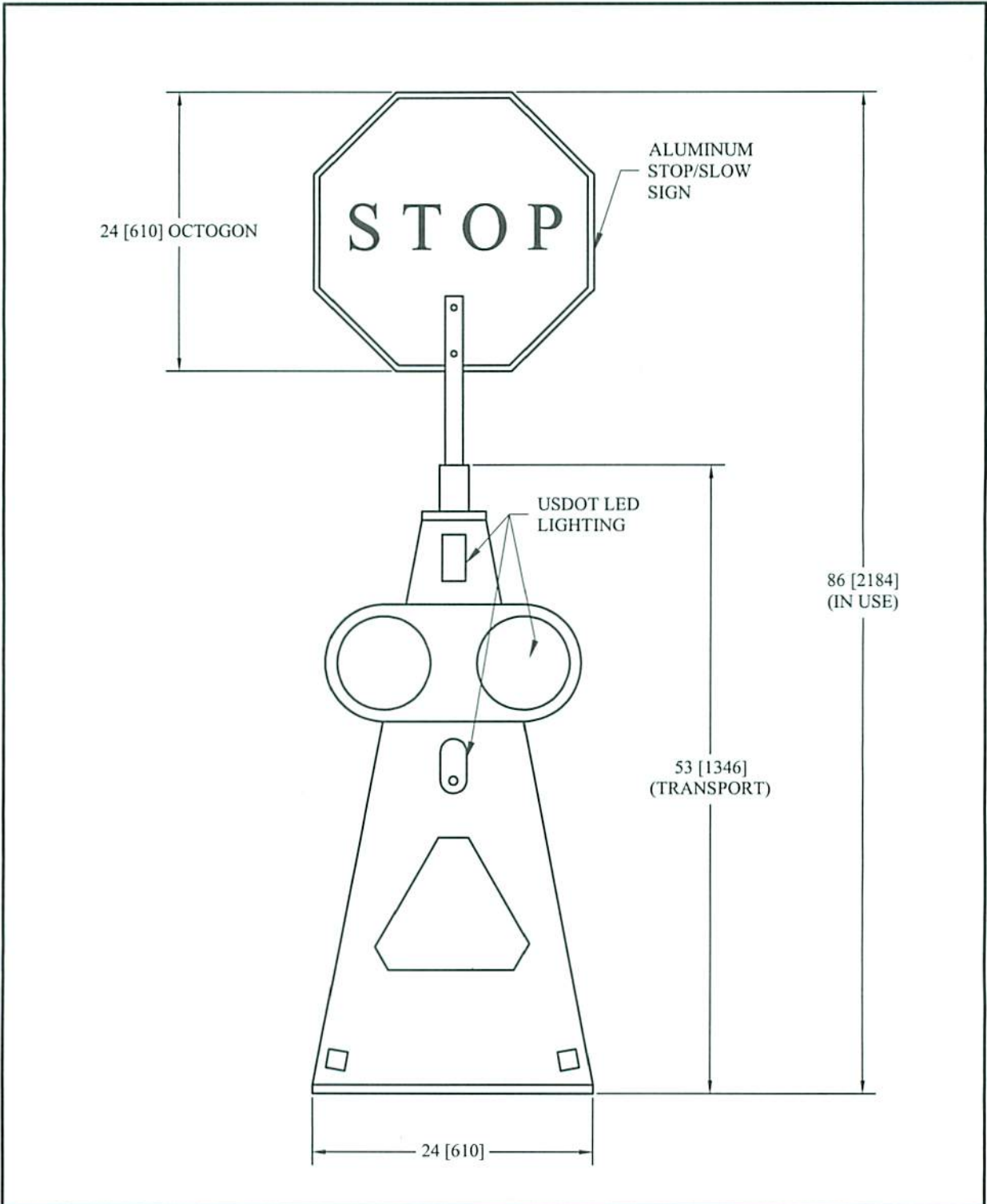
Attach to this form:

- 1) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 2) 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 key to understanding the 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





REMOTE OPERATED SAFETY ATTENDANT (ROSA)


**Roundspring Technologies, Inc.**  
 Springfield, Missouri  
 Made in the U.S.A.  
 U.S. and other patents pending.

**SWMxx**

SHEET NO.	REF. NO.
1 of 2	

### INTENDED USE

The Roundspring Technologies, Inc. Remote Operated Safety Attendant (ROSA) is a work zone traffic control device used to regulate, warn, and advise road users to traverse a section of highway or street in the proper manner.

ROSA is an Automated Flagging Assisted Device (AFAD) compliant device that allows remote operation of an AASSTO compliant STOP / SLOW sign. ROSA allows the flagger to rotate the sign from a safe position away from potentially dangerous traffic. ROSA has been successfully crash tested to the Manual for Assessing Safety Hardware (MASH) Test 3-71 impact conditions.

Weight: 82 kg [180 lb]

Sign Height: 2184 mm [86 in.] deployed, 1346 mm [53 in.] storage and transport

Power: Rechargeable 12 VDC

Signage: AASHTO compliant retroreflective STOP / SLOW

Lighting: USDOT LED with solid state flasher

### CONTACT

Roundspring Technologies, Inc.

8714 W. Farm Road 124

Springfield, MO 65802

Phone : (417) 849-0300


## REMOTE OPERATED SAFETY ATTENDANT (ROSA)

**SWM<sub>xx</sub>**

SHEET NO.

REF. NO.

2 of 2

 Roundspring Technologies, Inc.  
Springfield, Missouri  
Made in the U.S.A.  
U.S. and other patents pending.



t = 0.000 sec



t = 0.060 sec



t = 0.120 sec



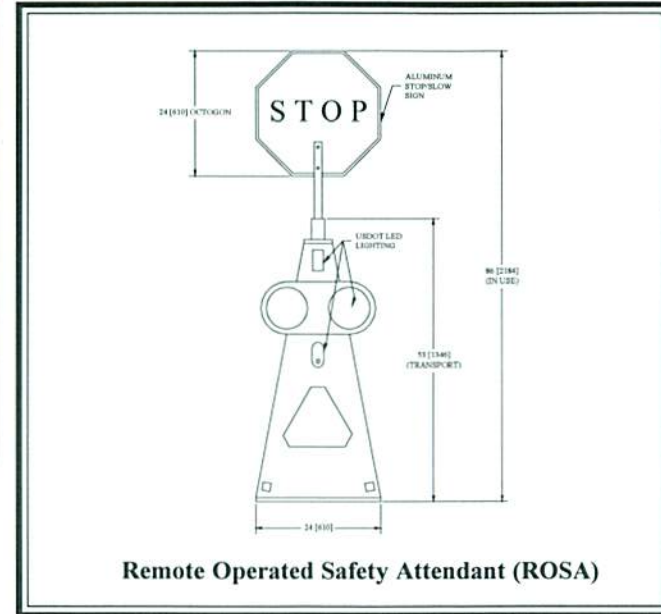
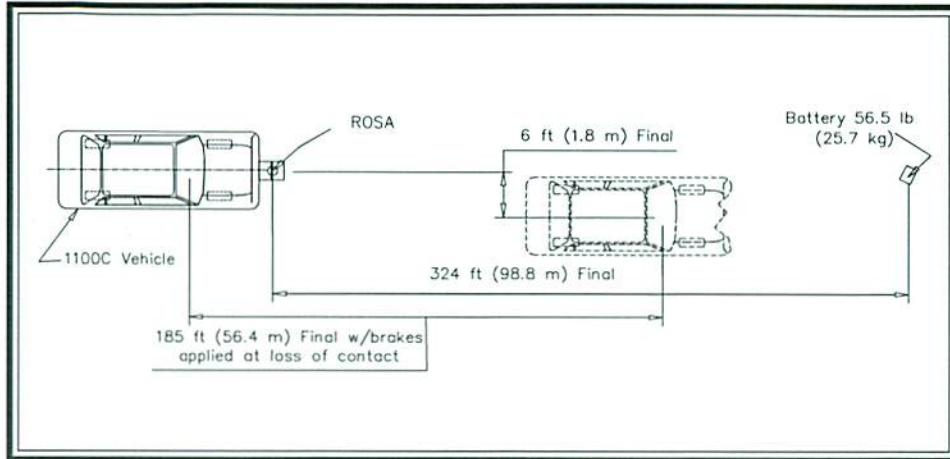
t = 0.180 sec



t = 0.240 sec



t = 0.300 sec



Remote Operated Safety Attendant (ROSA)

ROSA Crash Test Results - 11 of 23

**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... MASH Test 3-71  
 Test No. .... 77-2865-001  
 Date ..... 7/25/12

**Test Article**

Type ..... Roundspring Technologies, Inc.  
 Remote Operated Safety Attendant (ROSA)  
 Dimensions ..... 86 in. OA Height x 24 in. Base  
 Width (2184 x 610 mm)  
 Material and key elements ..... 183 lb (83.2 kg) Fully Operational  
 Foundation Type and Condition ..... Asphalt, clean and dry

**Test Vehicle**

Type ..... Production Model  
 Designation ..... 1100C  
 Model ..... 2004 Kia Rio

**Mass**

Curb ..... 2410 lb (1093 kg)  
 Test inertial ..... 2467 lb (1119 kg)  
 Dummy ..... Not Used  
 Gross Static ..... 2467 lb (1119 kg)

**Impact Conditions**

Speed ..... 62.4 mi/h (100.4 km/h)  
 Angle (deg) ..... 0  
 Impact Severity ..... 320.9 ft-kip (435.2 kJ)

**Exit conditions**

Speed ..... 53.5 mi/h (86 km/h)  
 Angle (deg - veh. c.g.) ..... 0

**Occupant Risk Values\***

**Post-Impact Vehicular Behavior (deg) \*\***

**Vehicle Damage (Normal Orientation Impact)**

Exterior  
 VDS ..... FC-1  
 CDC ..... 12FCEW1  
 Interior  
 VCDI ..... NS000000  
 Maximum Deformation ..... Negligible  
 Windshield ..... No Damage

\* Not Applicable, device weighs less than 220 lb (100 kg).

\*\* Negligible roll, pitch and yaw.

Figure 1. Summary of Results - ROSA Test 77-2865-001



E-TECH Testing Services, Inc.



**E-TECH Testing Services, Inc.**

3617 B Cincinnati Avenue

A Trinity Industries  
Inc. Company

Rocklin, CA 95765

PHONE (916) 644-9146

FAX (916) 645-3653

August 27, 2012

Mr. John Williams  
Roundspring Technologies, Inc.  
8712 W. Farm Road 124  
Springfield, MO 65802

**MASH 2270P VEHICLE WAIVER**

Thank you for using the services of E-TECH Testing Services, Inc. (E-TECH). E-TECH recently completed crash testing on the Remote Operated Safety Attendant (ROSA) using the recommendations in the American Association of State Highway and Transportation Officials "*Manual For Assessing Safety Hardware*" (MASH).<sup>1,2</sup> MASH categorizes the product as work-zone traffic control device. These devices are used in a work-zone to regulate, warn, and guide road users and advise them how to traverse a section of highway or street in the proper manner.

As recommended in MASH, the primary concern regarding the impact behavior of work-zone traffic control devices is the risk to occupants of both the small 1100C (2425 lb /1100 kg) and heavy 2270P (5004 lb / 2270 kg pickup truck) test vehicles from detached elements, fragments, or other debris. MASH recommends up to three tests on work-zone traffic control devices, Tests 70, 71, and 72. Test 70 is designed to evaluate the ability of the small car to activate any breakaway, fracture, or yielding mechanism associated with the device during low-speed impacts. For freestanding, lightweight devices weighing less than 220 lb (100 kg), such as ROSA, then this test is optional. Tests 71 and 72 are intended to evaluate the behavior of the device during high-speed impacts. The most common risks of failure for these tests include intrusion of device components into the vehicle windshield, vehicle instability, and occupant risk criteria.

Test 71 with the small car is recognized as the more critical test by the FHWA and depending on the results of this test then Test 72 with the pickup truck may, or may not be, necessary. If there is no evidence of vehicle instability or windshield penetration in Test 71, or reason to believe that the pickup truck windshield would have been penetrated in this impact condition, then Test 72 need not necessarily be run. It was with this understanding that only crash tests with the 1100C vehicle were used to evaluate the crash test performance of ROSA. The decision to forego testing with the 2270P vehicle was based on an analysis of the 1100C crash test results that indicated the 1100C vehicle represented the "worst case" impact condition. Following is a summary of that analysis.

<sup>1</sup> American Association of State Highway and Transportation Officials (AASHTO). "Manual for Assessing Safety Hardware", Washington, DC, 2009

<sup>2</sup> LaTurner, John F. "MASH Crash Test Results for Remoted Operated Safety Attendant (ROSA)" E-TECH Testing Services, Inc. Report #397, Rocklin, California. August 2012

The analysis began with a comparison of the 1100C and 2270P vehicle geometry. Figure 1 lists the geometry of a typical 2270P vehicle and Figure 2 lists that of a typical 1100C vehicle.

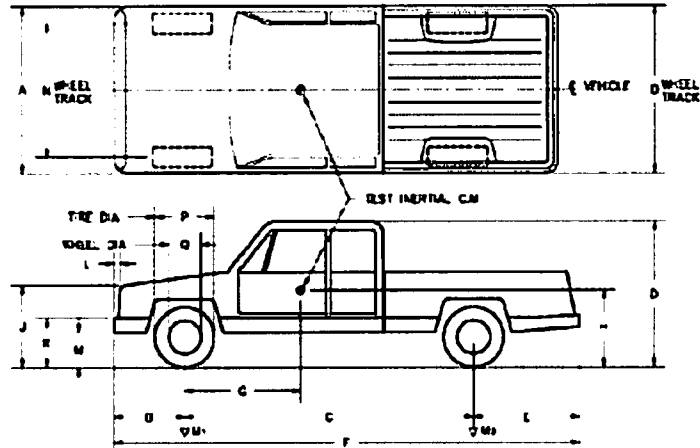
### 2270P Vehicle Parameters

Test Date	5/20/2011
E-TECH Test #	01-3044-006
Test Designation	MASH 08 Test 3-35
Make	Dodge
Model	2270P
Year	2005
VIN	1D7HA18D05S306873
Tire Size:	265/70 R17
Odometer Reading	196,199
Engine Type	8 Cylinder
Engine Size	5.7 L
Transmission Type	Automatic
Pre-Test Damage	none
Dummy Type	None
Dummy Seat	N/A
Dummy Mass	0.0 lb 0.0 (kg)

#### Test Inertial Mass Distribution

	lb	(kg)	lb	(kg)
LF	1410.9	640	RF	1384.5 628
LR	1078.0	489	RR	1084.7 492

#### Vehicle Geometry Dimensions



	in.	(cm)		in.	(cm)
A	78.7	200.0	J	41.3	105.0
B	36.2	92.0	K	26.0	66.0
C	140.6	357.0	L	3.9	10.0
D	72.0	183.0	M	15.7	40.0
E	47.2	120.0	N	69.7	177.0
F	225.2	572.0	O	67.7	172.0
G	61.3	155.7	P	30.1	76.5
H	29.5	75.0	Q	17.0	43.2

#### Vehicle Mass

	Curb		Test Inertial		Gross Static	
	lb	(kg)	lb	(kg)	lb	(kg)
M1	2828.5	1283	2795.4	1268	2795.4	1268
M2	2105.4	955	2162.7	981	2162.7	981
MT	4933.9	2238	4958.1	2249	4958.1	2249

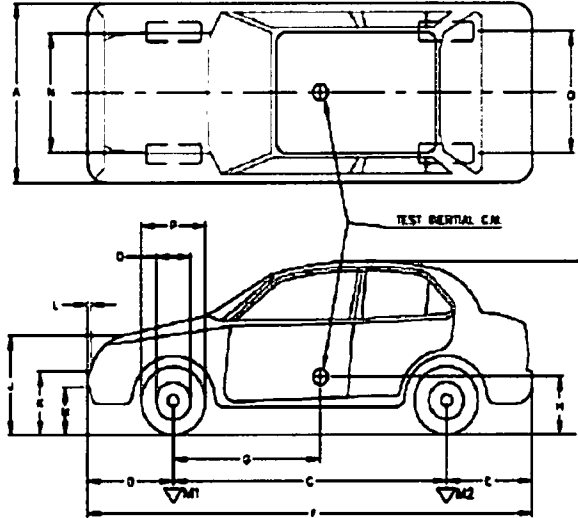
## 1100C Vehicle Parameters

Test Date	7/25/2012
E-TECH Test #	77-2865-001
Test Designation	MASH 08 Test 3-71
Make	Kia
Model	1100C
Year	2004
VIN	KNADC125756376557
Tire Size:	175/75 R14
Odometer Reading	112,693
Engine Type	4 Cylinder
Engine Size	1.6 LT
Transmission Type	Automatic
Pre-Test Damage	NONE
Dummy Type	N/A
Dummy Seat	N/A
Dummy Mass	0.0 lb 0.0 (kg)

### Test Inertial Mass Distribution

	lb	(kg)	lb	(kg)
LF	800.3	363	RF	782.6 355
LR	458.6	208	RR	425.5 193

### Vehicle Geometry Dimensions



	in.	(cm)		in.	(cm)
A	63.4	161.0	J	26.8	68.0
B	32.7	83.0	K	21.7	55.0
C	95.3	242.0	L	3.5	9.0
D	55.5	141.0	M	14.2	36.0
E	38.6	98.0	N	57.9	147.0
F	166.5	423.0	O	57.5	146.0
G	34.3	87.2	P	21.9	55.5
H	15.7	40.0	Q	14.0	35.6

### Vehicle Mass

	Curb		Test Inertial		Gross Static	
	lb	(kg)	lb	(kg)	lb	(kg)
M1	1549.8	703	1582.9	718	1582.9	718
M2	859.8	390	884.0	401	884.0	401
MT	2409.6	1093	2466.9	1119	2466.9	1119

One of the most critical vehicle geometry measurements to consider in the analysis of the interaction between the test article and the vehicle is the height of the vehicle hood, Dimension J in Figures 1 and 2. The typical height of the 2270P hood is approximately 41 in. and the height of a 1100C hood is approximately 27 in. high. A device significantly taller than 45 in., such as ROSA (86 in.), could potentially interact with the 2270P vehicle windshield therefore a worst case analysis is necessary.

Figure 3 is a side by side comparison of how the 86 in. high ROSA interacts with both the 1100C and 2270P vehicle front ends. The distance along the top of the 1100C hood from the leading edge to the bottom of the windshield is 39 in. The same distance for the 2270P is 49 in. Figure 4 is a sequence of images taken from the high speed video of the 1100C vehicle crash test on ROSA. As can be seen in this sequence the portion of the ROSA above the hood height folds over only slightly along the length of the hood and the tip of the sign makes no contact with the windshield.



Figure 3. Test Article Interaction with 1100C and 2270P Vehicle

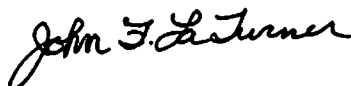


Figure 4. Sequential High Speed Images of 1100C Interaction

Since the length of the portion of ROSA above the 2270P hood height is less than the distance along the top of the hood to the windshield it is even less likely the device would contact the windshield at a significant velocity with this vehicle either. If at some point after the initial impact the sign did somehow eventually contact the windshield ROSA would have already been accelerated to the velocity of the vehicle therefore it would not likely have damaged the windshield. There is no reason to believe that the 2270P pickup truck windshield would have been contacted or penetrated had the test been repeated with that vehicle. This analysis identified the 1100C vehicle as the worst case and provided the justification for waiving additional testing with the 2270P vehicle.

Should you require further information or have any questions regarding this analysis please call.

Sincerely,

A handwritten signature in black ink that reads "John F. LaTurner". The signature is written in a cursive style with a large initial 'J' and 'L'.

John F. LaTurner, P.E.