U.S. Department
of Transportation
Federal Highway Administration

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

September 6, 2017

In Reply Refer To:
HSST-1/ WZ-355

Henry A. Ross, Director
Government Relations
Plasticade
7700 N. Austin Avenue
Skokie, IL 60077

Dear Mr. Ross:

This letter is in response to your April 7, 2017 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-355 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:

- Plasticade SS420 Sign Stand System with Industry Standard 48" x 48" Aluminum Sign

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'(AASHTO) 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: Plasticade SS420 Sign Stand System with Industry Standard 48" x 48" Aluminum Sign
Type of system: Work Zone Traffic Control Devices
Test Level: MASH Test Level 3
Testing conducted by: E-Tech
Date of request: April 7, 2017
Date of completed package: June 29, 2017

FHWA concurs with recommendation of the accredited crash testing laboratory as stated within the attached form on determination of eligibility for the sign substrate that was physically tested (Industry Standard 48" x 48" Aluminum Sign). This determination of eligibility does not apply to other sign substrates not physically tested, but recommended by the laboratory. If an eligibility letter is requested on these other sign substrates, this will require successful physical crash testing as per 2016 AASHTO MASH.

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

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter and will need to be tested in accordance with all recommended tests in AASHTO's MASH as part of a new and separate submittal.

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 AASHTO's 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-355 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,

Robert Ritter
Acting Director, Office of Safety
Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	April 05, 2017	◉ New ○ Resubmission
	Name:	Henry A. Ross	
	Company:	Plasticade	
	Address:	7700 N. Austin Avenue, Skokie, IL 60077	
	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

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'WZ': Crash Worthy Work Zone Traffic Control Devices	◉ Physical Crash Testing ○ Engineering Analysis	Plasticade SS420 Sign Stand System	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:	Henry A. Ross	Same as Submitter ☒
Company Name:	Plasticade	Same as Submitter ☒
Address:	7700 N. Austin Avenue, Skokie, IL 60077	Same as Submitter ☒
Country:	USA	Same as Submitter ☒

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

The Plasticade SS420 Sign Stand System is the commercial embodiment of intellectual property that is not protected by patents. Plasticade does not pay royalties for sales of the Plasticade SS420 Sign Stand System. The Plasticade SS420 Sign Stand System was designed and developed by engineers at Plasticade.
Plasticade sponsored certain crash tests of the Plasticade SS420 Sign Stand System; such tests were conducted by E-Tech Testing Services, an independent, wholly-owned subsidiary of Trinity Highway. E-Tech Testing Services is an International Standards Organization (ISO) 17025 accredited laboratory with American Association for Laboratory Accreditation (A2LA) Mechanical Testing certificate 989.01. Full-scale crash testing on the Plasticade SS420 Sign Stand System was performed in accordance with testing criteria, as set forth by the Manual for Assessing Safety Hardware (MASH), 2009.

PRODUCT DESCRIPTION

(•) New Hardware or Significant Modification ( ) Modification to Existing Hardware

Plasticade's SS420 Sign Stand System is a work zone traffic control device designed to regulate, warn, and advise road users to traverse a section of highway or street in the proper manner. The sign stand consists of a base frame with two upright springs and four fixed length aluminum legs and components to secure an industry standard 1.22 m x 1.22 m or smaller aluminum sign or signs of lighter weight materials. The aluminum signs were attached to the stand using top and bottom sign brackets attached to the vertical mast. The mast also has a bracket to hold three wooden handled vinyl flags. The as tested mounting height of the sign measures 0.46 m above grade. The SS420 stand weighs 16.5 kg, excluding the 8.5 kg aluminum sign.

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:	Paul Kruse	
Engineer Signature:	Paul Kruse Digitally signed by Paul Kruse DN: cn=Paul Kruse, o=Trinity Highway, ou=E-TECH Testing Services, email=paul.kruse@etechtesting.com, c=US Date: 2017.04.06 13:15:25 -07'00' Adobe Acrobat DC version: 2015.023.20070	
Address:	3617 Cincinnati Ave, Rocklin, CA 95765	Same as Submitter ☐
Country:	United States	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)		Non-Critical, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	Test of Plasticade SS420 Sign Stand device with a MASH specified 1100C test vehicle. The test was run on 12/5/16. The curb mass of the vehicle was 1121.0 kg and the final test inertial mass was 1124.0 kg. Impact speeds were 101.4 km/h and 99.4 km/h for the 0 and 90 degree sign stands, respectively. For the 0 degree test, the 1100C vehicle's front bumper impacted the vertical member of the sign stand just above the springs. The vertical upright immediately fractured and the sign immediately detached and draped over the hood and windshield. The sign deformed the entire windshield. The top of the vertical upright struck the roof of the vehicle. The sign and vertical upright elevated over the vehicle. The lower portion of the stand was caught under the vehicle until the vehicle came to a stop. For the 90 degree test, the 1100C vehicle's front bumper impacted the vertical member of the sign stand just above the springs. The vertical upright immediately fractured above the springs and allowed the sign to rotate on to the vehicle's hood. The sign and upright rebounded off the hood and left contact with the vehicle. The lower portion of the stand passed under the vehicle and then quickly bounded up forcing the vehicle to elevate. The stand continued to roll under the car until it exited the vehicle. The test vehicle sustained minor damage to the bumper, hood, and roof; there was no damage to the undercarriage of the test vehicle. There was significant deformation to the windshield, with a maximum deformation of 67 mm. The top corners of the windshield liner tore but the damage was caused by stretching of the liner rather than direct contact with the sign. There was no penetration or deformation of the occupant compartment.	PASS

3-72 (2270P)	Test of the Plasticade SS420 Sign Stand device with a MASH specified 2270P test vehicle. The test was run on 11/16/16. The curb mass of the vehicle was 2205.5 kg and the final test inertial mass was 2230.5 kg. Impact speeds were 100.7 km/h and 98.7 km/h for the 0 and 90 degree sign stands, respectively. For the 0 degree test, the 2270P vehicle's front bumper impacted the vertical member of the sign stand just above the springs. As the upright yielded, the upper section detached from the lower. The lower portion remained attached to the stand as it passed under the vehicle. The sign completely released from the stand and draped over the upper grille and hood areas. The detached upper section of the vertical upright rotated onto the vehicle's hood and penetrated into the engine compartment. It then elevated above the cab, made contact with the tailgate, and came to rest behind the vehicle. The lower section of the stand wedged under the vehicle and remained there until the vehicle stopped. For the 90 degree test, the 2270P vehicle's bumper impacted the lower section of the aluminum sign prior to impacting the vertical member of the sign stand just above the springs. The vertical upright immediately released from the lower portion of the sign stand, impacted the bumper, and was propelled ahead of the vehicle. The sign detached early in the event, struck the front of the hood, and then lifted above the vehicle. The lower section of the stand wedged under the vehicle and remained there until the vehicle stopped. The test vehicle sustained minor damage to the front bumper; there was no damage to the undercarriage of the test vehicle. There was no damage to the windshield. There was no penetration or deformation of the occupant compartment. The Plasticade SS420 was judged by E-TECH to have successfully met MASH evaluation criteria for Test Level 3 under the criteria for work zone traffic control devices.	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:	E-Tech Testing Services, Inc.	
Laboratory Signature:	Paul Kruse Digitally signed by Paul Kruse DN: cn=Paul Kruse, o=Trinity Highway, ou=E-TECH Testing Services, email=paul.kruse@etechtesting.com, c=US Date: 2017.04.06 13:14:35 -07'00' Adobe Acrobat DC version: 2015.023.20070	
Address:	3617B Cincinnati Ave, Rocklin, CA 95765	Same as Submitter ☐
Country:	United States	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	A2LA Certificate #989.01, November 20, 2015 thru November 30, 2017	

Submitter Signature*: Henry A. Ross Digitally signed by Henry A. Ross DN: cn=Henry A. Ross, o=Plasticade, ou, email=hross@plasticade.com, c=US Date: 2017.04.06 15:35:36 -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:

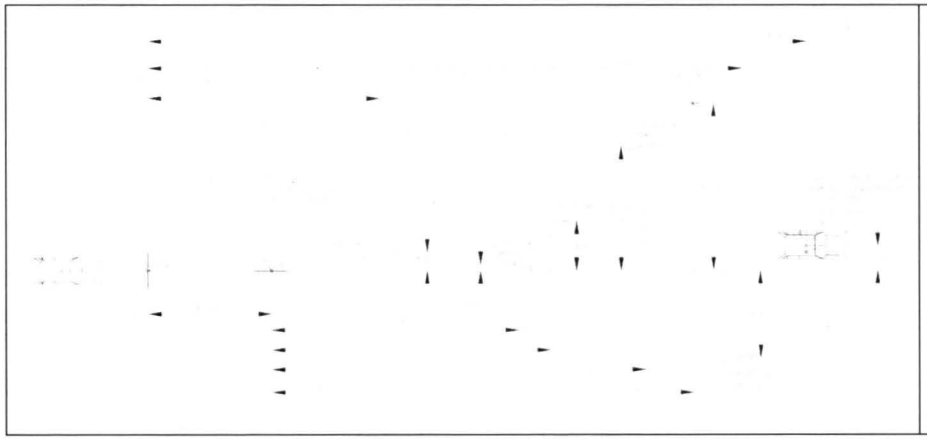
Eligibility Letter		
Number	Date	Key Words

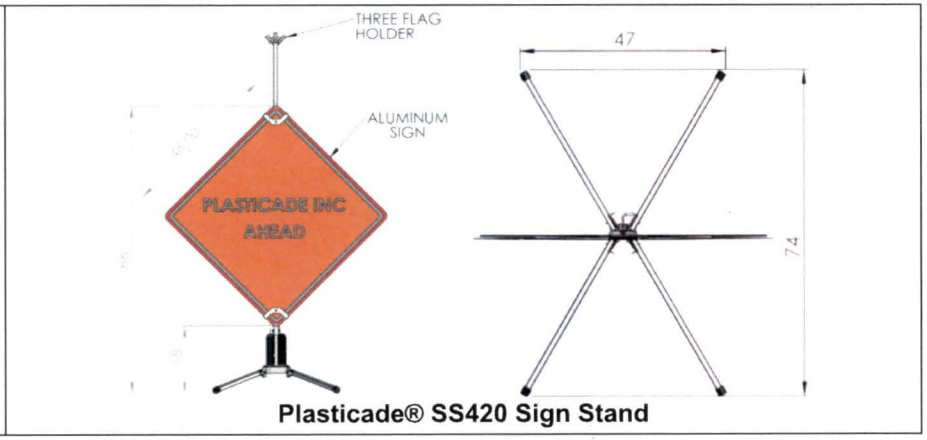
Normal (0 deg) Orientation

t = 0.000 sec | t = 0.062 sec | t = 0.125 sec | t = 0.187 sec

Perpendicular (90 deg) Orientation

t = 0.000 sec | t = 0.063 sec | t = 0.125 sec | t = 0.219 sec





Plasticade® SS420 Sign Stand

General Information
Test Agency ..... E-TECH Testing Services
Test Designation ..... MASH Test 3-71
Test No. 76-0459-001
Date 12/5/2016

Test Article
Type ..... Plasticade
Stand with Double Spring Base
Aluminum Legs and Upright (SS420)
Work-Zone Traffic Control Device
Dimensions ..... 2.77 m OA Height x 173 cm Wide
Installation Details ..... Industry Standard 48"x48" Aluminum Sign
457 mm Sign Height (Bottom of Sign to Grade)
Material and Key Elements ..... 16.5 kg Stand, Aluminum Legs and Upright, Steel Base Assembly
8.5 kg Aluminum Sign
Foundation Type and Condition ..... Asphalt, clean and dry

Test Vehicle
Type ..... Production Model
Designation 1100C
Model ..... 2010 Hyundai Accent
Curb ..... 1121.0 kg
Test Inertial ..... 1124.0 kg
Dummy ..... N/A
Gross Static ..... 1124.0 kg

Impact Conditions
Speed (Normal Orientation) ..... 101.4 kph
Speed (Perpendicular Orientation) ..... 99.4 kph
Impact Severity (Normal Orientation) ..... 445.8 kJ
Impact Severity (Perp. Orientation) ..... 428.1 kJ

Exit Conditions
Speed (Normal Orientation) ..... 99.4 kph
Speed (Perpendicular Orientation) ..... 97.4 kph
Angle (deg) 0

Vehicle Damage
Exterior
VDS FC-1
CDC 12FCLN1
Windshield Damage ..... 67 mm max. deformation

Interior
Maximum Deformation ..... Negligible

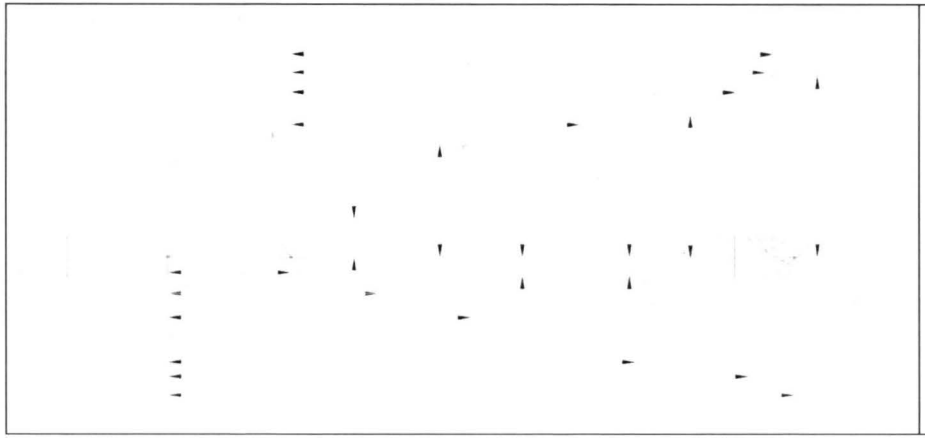
Figure 2 - Summary of Results – Plasticade® SS420 Sign Stand Test 76-0459-001

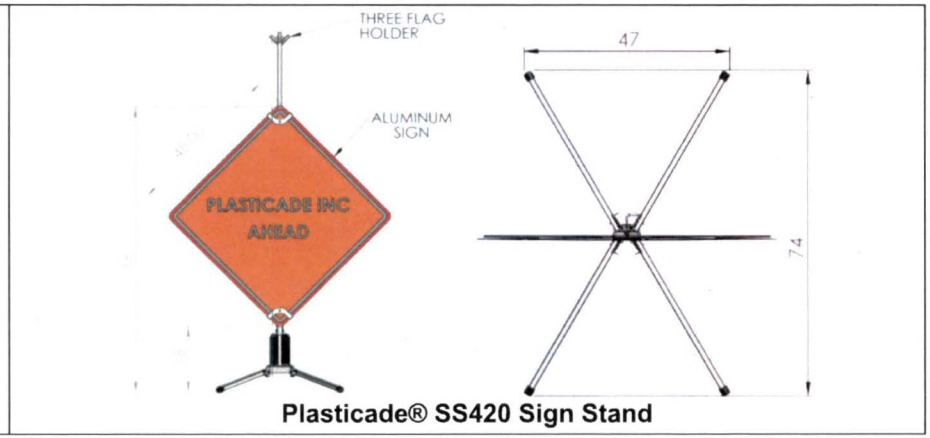
Normal (0 deg) Orientation

t = 0.000 sec | t = 0.058 sec | t = 0.115 sec | t = 0.173 sec

Perpendicular (90 deg) Orientation

t = 0.000 sec | t = 0.114 sec | t = 0.229 sec | t = 0.400 sec





Plasticade® SS420 Sign Stand

General Information

Test Agency	E-TECH Testing Services
Test Designation	MASH Test 3-72
Test No	76-0459-002
Date	11/16/2016

Test Article

Type	Plasticade Stand with Double Spring Base Aluminum Legs and Upright (SS420) Work-Zone Traffic Control Device
Dimensions	2.77 m OA Height x 173 cm Wide
Installation Details	Industry Standard 48"x48" Aluminum Sign 457 mm Sign Height (Bottom of Sign to Grade)
Material and Key Elements	16.5 kg Stand, Aluminum Legs and Upright, Steel Base Assembly 8.5 kg Aluminum Sign
Foundation Type and Condition	Asphalt, clean and dry

Test Vehicle

Type	Production Model
Designation	2270P
Model	2010 Dodge Ram
Curb	2205.5 kg
Test Inertial	2230.5 kg
Dummy	N/A
Gross Static	2230.5 kg

Impact Conditions

Speed (Normal Orientation)	100.7 kph
Speed (Perpendicular Orientation)	98.7 kph
Impact Severity (Normal Orientation)	873.4 kJ
Impact Severity (Perp. Orientation)	838.8 kJ

Exit Conditions

Speed (Normal Orientation)	98.7 kph
Speed (Perpendicular Orientation)	96.8 kph
Angle (deg)	0

Vehicle Damage

Exterior

VDS	FC-1
CDC	12FCLN1
Notable Deformation	None

Interior

Maximum Deformation	Negligible

Figure 7 - Summary of Results – Plasticade® SS420 Sign Stand Test 76-0459-002

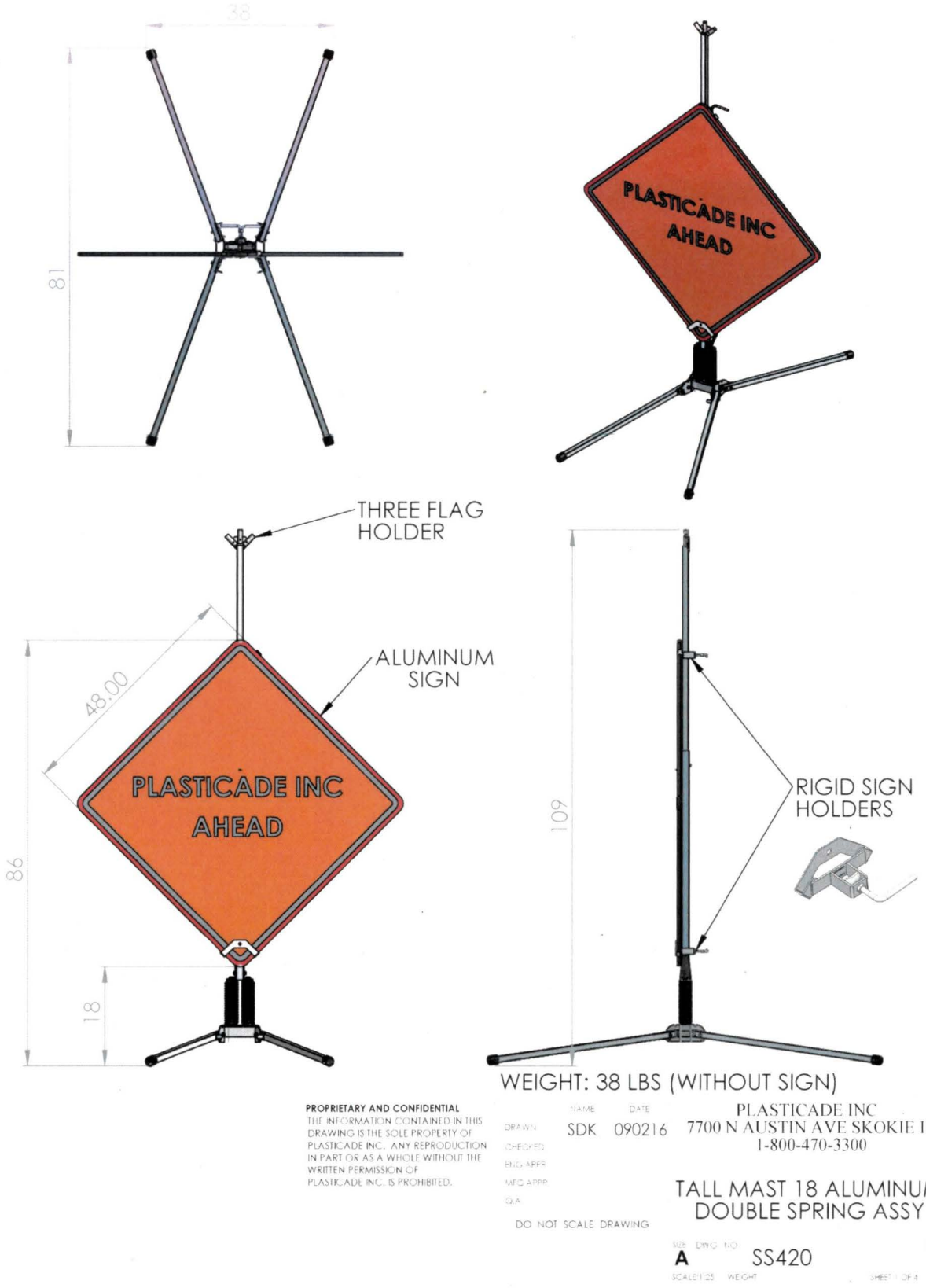
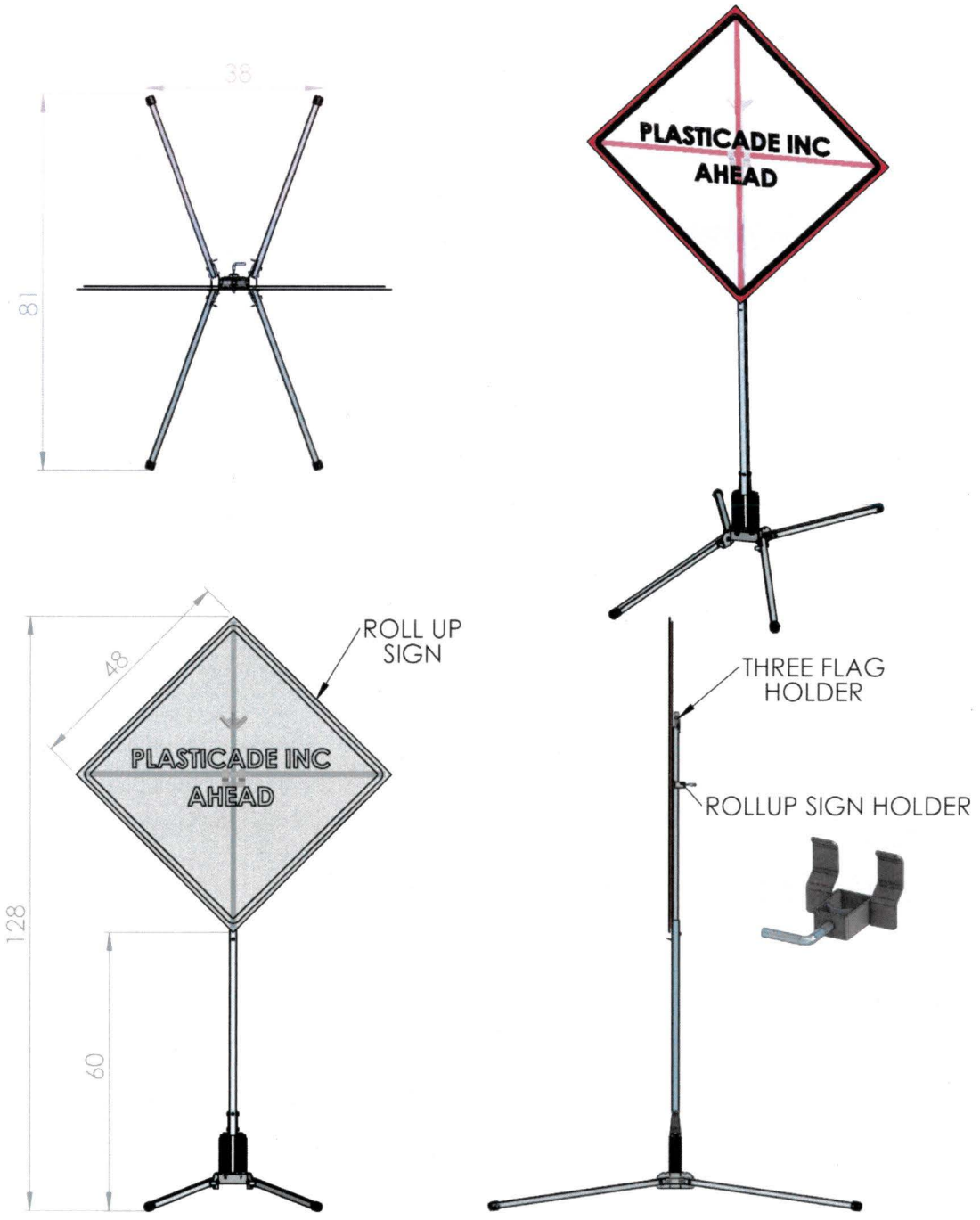


Illustration 1 – Plasticade® SS420 Technical Drawing (Sheet 1 of 4)



PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF PLASTICADE INC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF PLASTICADE INC. IS PROHIBITED.

	NAME	DATE
DRAWN	SDK	090216
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ENG APPR.		
MFG APPR.		
Q.A.		

DO NOT SCALE DRAWING

PLASTICADE INC
7700 N AUSTIN AVE SKOKIE IL
1-800-470-3300

TALL MAST 18 ALUMINUM
DOUBLE SPRING ASSY

WEIGHT: 38 LBS (WITHOUT SIGN)

SIZE A | DWG. NO. SS420 | REV H

SCALE:1:30 WEIGHT: SHEET 2 OF 4

Illustration 2 – Plasticade® SS420 Technical Drawing (Sheet 2 of 4)

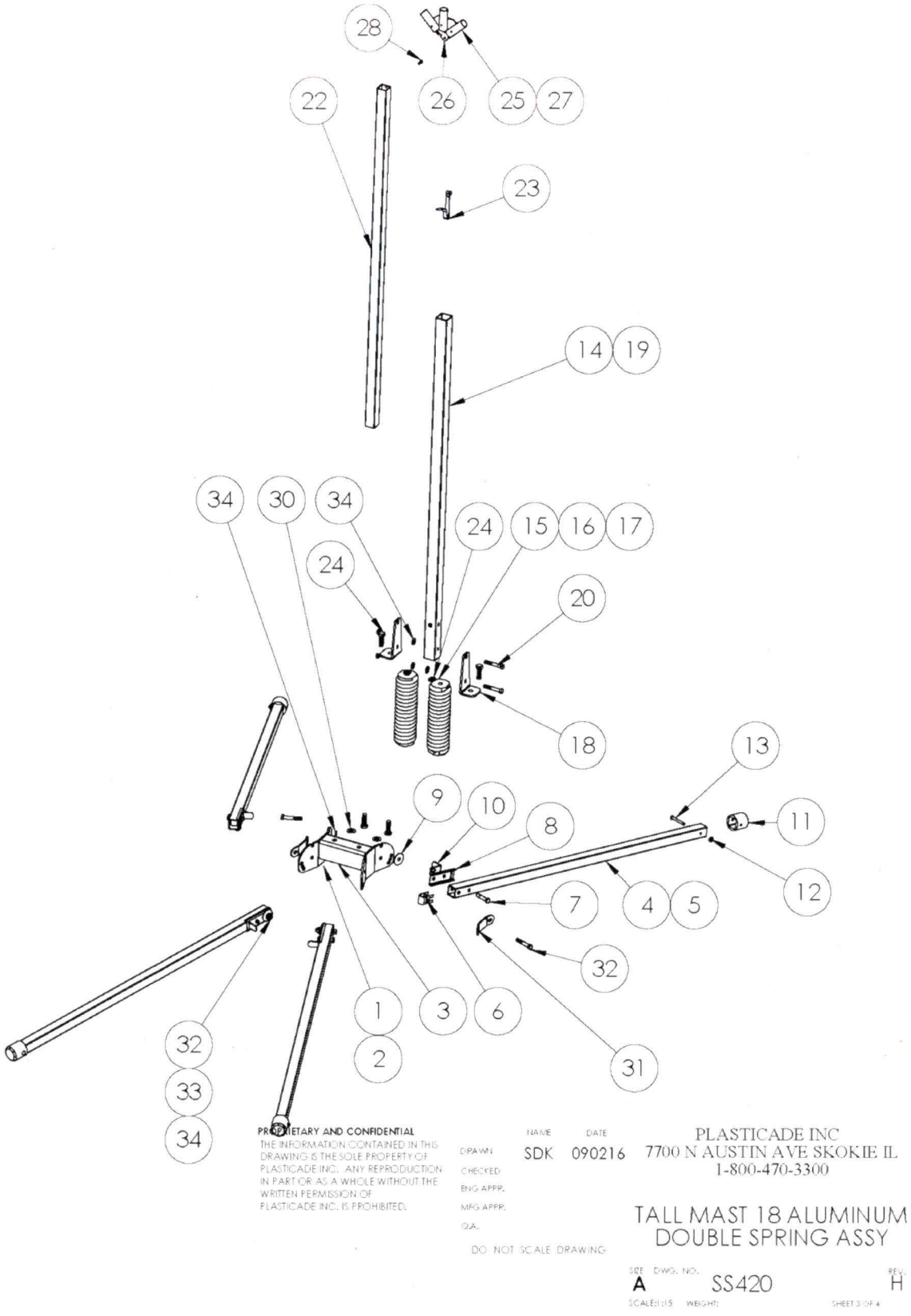

Illustration 3 – Plasticade® SS420 Technical Drawing (Sheet 3 of 4)

SS420	42000	42000 STAND ASSEMBLY	RSM42000-160902			
ITEM	PART NUMBER	DESCRIPTION	DRAWING NUMBER	MATERIAL	FINISH	Quantity
1	BAHS	BAHS BASE ASSEMBLY	RSMB400-160825			1
2	BAHS-01	BASE SIDE PLATE ALUMINUM STAND	RSMB401-160825	STEEL Q235	POWDER COAT	2
3	BAHS-02	BASE CENTER SUPPORT ALUMINUM STAND	RSMB402-160825	STEEL Q235	POWDER COAT	1
4	41000 ASLA	18 INCH ALUM STAND LEG ASSEMBLY	RSML18N-161031			4
5	ALR-32-1050V2	42000 18 INCH SPRING STAND ALUMINUM LEG	RSML155-140331	ALUM 6063 T-5	ALUMINUM	1
6	LLA-FLAT-SPRING	LATCH SPRING	RSML172-160823	STEEL MN65	DICHROMATE	1
7	LLA-PIN	LEVER PIN	RSML162-140730	STEEL Q235	DICHROMATE	1
8	LLA-32-V2	LEG LEVER PIN COVER ALUM LEGS	RSML166-140331	STEEL Q235	ZINC PLATE	1
9	LLA-LWASHER	WASHER .41 I.D. 1.5 O.D X .065	SEE WASHER SHEET	STEEL	ZINC PLATE	1
10	LLA-LEVER	LEG LEVER	RSML163-140817	STEEL Q235	ZINC PLATE	1
11	RF-32	32MM RUBBER FOOT	RSML110-140606	RUBBER	RUBBER	1
12	LLA-FOOT WASHER	WASHER .28 I.D. X .63 O.D. X .07	WASHER SHEET	STEEL	ZINC PLATE	1
13	RIVET-RF-54	RIVET STEEL ZINC 54MM	RIVET MASTER SHEET	STEEL	ZINC PLATE	1
14	42000 MA	42000 MAST ASSEMBLY	RSMM575-140619			1
15	SA-500	500 SPRING ASSEMBLY	RSMS475-160729			2
16	SA-500-01	SPRING	RSMS400-160729	STEEL SAE9254	E-COAT	2
17	SA-500-02	SPRING PLUG	RSMS450-140604	DIE CAST	DIE CAST	4
18	SA-MB	38 MM SPRING MAST BRACKET	RSMM200-140331	STEEL Q235	POWDER COAT	2
19	M-A38-1180	42000 STAND LOWER MAST ALUM	RSMM550-140811	ALUM 6063 T-5	ALUMINUM	1
20	LLA-BOLT	BOLT HEX CAP 3/8-16 X 2-1/2	BOLT/NUT SHEET	STEEL	ZINC PLATE	2
21	LLA-NLN	NUT NYLON LOCK 3/8-16	BOLT/NUT SHEET	STEEL	ZINC PLATE	2
22	M-A32-1170	42000 UPPER MAST ALUM	RSMM500-140331	ALUM 6063 T-5	ALUMINUM	1
23	MSB-12	LEG SPRING BUTTON 10MM	RSMM700-140331	STEEL	ZINC PLATE	1
24	SA-BOLT	BOLT HEX CAP 1/2-13 X 1-1/2	BOLT/NUT SHEET	STEEL GRADE 5	ZINC PLATE	4
25	FH-MAST	3 FLAG HOLDER FOR MAST ASSEMBLY	RSMA100-140331			1
26	FH-MAST -01	FLAG HOLDER FOR 32MM MAST BRACKET	RSMA102-140331	STEEL Q235	ZINC PLATE	1
27	FH-MAST-02	FLAG HOLDER MAST FLAG TUBE	RSMT101-140331	STEEL Q215	ZINC PLATE	3
28	RIVET 5MM POP	POP RIVET 5 MM	RIVET MASTER SHEET	ALUMINUM	ALUMINUM	2
29	HARDWARE					
30	SA-WASHER	WASHER .550 ID .100 OD X .07	WASHER SHEET	STEEL	ZINC PLATE	4
31	LC-32 V3	LEG CROSS OVER LARGE STAND	RSML145-141020	STEEL Q235	ZINC PLATE	2
32	LLA-BOLT	BOLT HEX CAP 3/8-16 X 2-1/2	BOLT/NUT SHEET	STEEL GRADE 5	ZINC PLATE	4
33	LLA-NLN	NUT HEX NYLON LOCK 3/8-16	BOLT/NUT SHEET	STEEL	ZINC PLATE	4
34	LLA-WASHER	WASHER .410 ID 1.00 OD X .07	WASHER SHEET	STEEL	ZINC PLATE	8

	NAME	DATE
DRAWN	SDK	090216
CHECKED		
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MFG APPR.		
Q.A.		

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1-800-470-3300

TALL MAST 18 ALUMINUM
DOUBLE SPRING ASSY

SIZE A | DWG. NO. SS420 | REV. H
SCALE:1:2 | WEIGHT: | SHEET 4 OF 4

Illustration 4 – Plasticade® SS420 Technical Drawing (Sheet 4 of 4)