

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

In Reply Refer To: HSST-1/SS-189

Bret R. Eckert Trinity Highway Products, LLC 15601 Dallas Parkway, Suite 525 Addison, TX 75001 USA

Dear Mr. Eckert:

We received your correspondence of February 11, 2022 requesting issuance of a reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively "device") described below. This letter is assigned Federal Highway Administration (FHWA) control number SS-189.

#### **ELIGIBILITY LETTERS**

The FHWA issues Federal-aid reimbursement eligibility letters for new roadside safety devices that are crash tested in accordance with the industry standard of the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH).

FHWA, the Department of Transportation, and the United States (government) do not regulate roadside safety devices, crash test facilities, or the manufacturing industry. Issuance of eligibility letters is discretionary and provided only as a service to the states. FHWA may, at its discretion, decline to issue, revise, or rescind an eligibility letter. Eligibility letters are only issued by the FHWA headquarters Office of Safety.

Eligibility letters are issued only as notice to the states that a device is eligible for reimbursement under the Federal-aid highway program. They do not establish approval or certification for any other purpose. Issuance of an eligibility letter is not a prerequisite or requirement for state transportation agencies seeking to use Federal-aid funds for roadside safety devices. State agencies may use a device for which an eligibility letter has not been issued and seek Federal-aid reimbursement.

#### FEDERAL-AID REIMBURSEMENT

The request for issuance of this letter certified the device was crash tested in accordance with the industry standard of AASHTO's MASH. This eligibility letter is based on that certification and the material offered in support of its issuance. The device described below is eligible for reimbursement under the Federal-aid highway program.

Name of system: S-Q 8 Slip Base Perforated, 3-Post Sign Support System

Type of system: Sign Support Test Level: Test Level 3

Testing conducted by: Applus IDIADA KARCO Engineering, LLC

Date of request: February 11, 2022

Information about the device, including material such as the eligibility request, crash test reports, drawings, or images are included in one or more attachment(s) to this letter.

Eligibility letter SS-189 is inapplicable to devices, optional equipment, alternate materials, or other features that were not crash tested in accordance with AASHTO's MASH.

This letter is issued only for the subject device as crash tested under AASHTO's MASH. Later modification(s) of the device are not eligible for Federal-aid reimbursement under this letter. Notice of later modification(s) should be given to transportation agencies, facility owners, and operators (collectively "agencies").

Agencies should be provided appropriate information about the device's design, installation, maintenance, materials, and mechanical properties.

Issuance of this letter is discretionary, and it may be revised or rescinded at FHWA's discretion. This letter is not a determination of compliance with the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) or ownership of any intellectual property rights.

This eligibility letter is not a determination by the government that a crash involving the subject device will result in any particular outcome. It is limited to only the device's eligibility for Federal-aid reimbursement.

### INTELLECTUAL PROPERTY

Issuance of this eligibility letter does not convey property rights of any sort nor any exclusive privilege. This letter is not authorization or consent by the government for the use, manufacture, or sale of any patented or proprietary system, device, design, product, or hardware for which the requester is not the patent owner. Eligibility letters are not an expression of any view, position, or determination by the government as to the validity, scope, or ownership of any intellectual property rights to a specific device. These letters do not grant, impute, suggest, or otherwise establish any ownership, distribution, or licensing rights to the requester. The government expresses no opinion about the intellectual property rights relating to any device for which this or any other eligibility letter is issued.

#### **PUBLIC DISCLOSURE**

To prevent any misunderstanding, and as discussed above, this eligibility letter is assigned FHWA control number SS-189. It should only be reproduced in full with its attachment(s). This letter and the material offered by the requester supporting its issuance is public information. All eligibility letters and supporting material are subject to public disclosure under the Freedom of

Information Act (FOIA). Eligibility letters are available to the public at <a href="https://safety.fhwa.dot.gov/roadway">https://safety.fhwa.dot.gov/roadway</a> dept/countermeasures/reduce crash severity/.

If you have any questions please contact Aimee Zhang at Aimee.Zhang@dot.gov.

Sincerely,

Amy Jackson-Grove Acting Director, Office of Safety Technologies

Office of Safety

Enclosures

# Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

	Date of Request:	February 11, 2022	<ul><li>New</li></ul>	○ Resubmission
	Name:	Bret R. Eckert, P.E.		
ter	Company:	Trinity Highway Products, LLC		
Submitt	Address:	15601 Dallas Parkway, Suite 525, Addison, TX 75001		
Country: USA		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
'SS': Breakaway Sign Supports, Mailboxes, & other small sign supports	Crasing Analysis	S-Q 8 Slip Base, Perforated, 3-Post Sign Support 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:

Jim Crowley	Same as Submitter
Trinity Highway Products, LLC	Same as Submitter 🖂
15601 Dallas Parkway, Suite 525, Addison, TX 75001	Same as Submitter 🖂
USA	Same as Submitter 🖂
	Trinity Highway Products, LLC 15601 Dallas Parkway, Suite 525, Addison, TX 75001

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

The S-Q 8 Slip Base, Perforated, 3-Post Sign Support System technology is the commercial embodiment of intellectual property that is owned by Trinity Highway Products, LLC ("THP"). THP does not pay royalties for sales of the S-Q 8 Slip Base, Perforated, 3-Post Sign Support System. The S-Q 8 Slip Base, Perforated, 3-Post Sign Support System was designed and developed by engineers at THP.

Applus IDIADA KARCO Engineering, LLC ("KARCO") conducted the certification tests of the S-Q 8 Slip Base, Perforated, 3-Post Sign Support System. KARCO is an internationally accredited third party crash testing laboratory. Physical crash testing of the S-Q 8 Slip Base, Perforated, 3-Post Sign Support System was performed in accordance with testing criteria, as set forth by the American Association of State Highway and Transportation Officials ("AASHTO") in the Manual for Assessing Safety Hardware - 2nd Edition, with 2020 Errata ("MASH") (2016). Other than fees paid to KARCO to conduct the tests and then analyze and report the test results, KARCO and THP do not share financial interests. The fees paid to KARCO were not dependent or contingent on the results of the tests.

### PRODUCT DESCRIPTION

	New Hardware or Modification to Existing Hardware
	The S-Q 8 Slip Base, Perforated, 3-Post Sign Support System consists of three, 2-1/2 inch x 12 gauge perforated
	square steel tube signposts inserted into three slip base castings. The signposts are punched with Ø7/16 inch
ı	holos spaced on one inch centers along the length on all four sides. The signposts are secured to the slip base

The S-Q 8 Slip Base, Perforated, 3-Post Sign Support System consists of three, 2-1/2 inch x 12 gauge perforated square steel tube signposts inserted into three slip base castings. The signposts are punched with  $\emptyset$ 7/16 inch holes spaced on one inch centers along the length on all four sides. The signposts are secured to the slip base castings with two  $\emptyset$ 3/8 inch shoulder bolts and nuts. The slip base castings are secured to the slip base stubs with three  $\emptyset$ 1/2 inch bolts and nuts. A bolt keeper plate is sandwiched between the slip base casting and the slip base stub. The anchor sleeves are 3 inch x 7 gauge square steel tube, 36 inches long with a 12 inch x 18 inch x 3/16 inch soil plate welded to it. The anchors are embedded in soil such that the slip base stub top plates are a maximum of 4 inches above grade. A 72 inch tall x 96 inch wide x 0.080 inch thick aluminum sign panel with reflective sheeting is secured to the signposts with a U-channel and clamp system. The sign is secured to three U-channel sections using  $\emptyset$ 3/8 inch bolts and nuts. The sign is mounted at a height of 7 feet 4 1/2 inches above grade to the bottom of the sign. The anchor sleeve conforms to ASTM A500 and the soil plate is fabricated from steel that conforms to ASTM A36. The signpost steel conforms to ASTM A653.

#### **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:	Antonio Reyes	
Engineer Signature:		ned by Antonio Reyes 01.28 14:40:01 -08'00'
Address:	9270 Holly Road, Adelanto, CA 92301 Same as Submitter	
Country:	USA	Same as Submitter 🖂

A brief description of each crash test and its result:

<b>.</b> =		rage 3 01 3
Required Test Number	Narrative Description	Evaluation Results
Number	Applus IDIADA KARCO Test No. P41196-01. Test Date July 19, 2021. Crash Test Report No. TR-P41196-01-NC for MASH 2016 Test 3-60 Crash Test of Trinity Highway Products S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3.	nesuits
3-60 (1100C)	The S-Q 8 Slip Base, Perforated, 3-Post Sign Support system (P41196-01) was impacted by a 2016 Kia Rio 4-door sedan at a velocity of 18.67 mph (30.05 km/h) and a CIA of 0°. Upon impact, the support structure yielded and made contact with the vehicle then fell to the ground. There was no significant deformation or penetration into the vehicle's occupant compartment. The vehicle experienced a maximum occupant impact velocity (OIV) of 15.7 ft/s (4.8 m/s) and a maximum ridedown acceleration (RA) of 2.0 g.	PASS
	The Trinity Highway Products S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3 Support Structure met all the requirements for MASH 2016 Test 3-60.	
	Applus IDIADA KARCO Test No. P41197-01. Test Date July 19, 2021. Crash Test Report No. TR-P41197-01-NC for MASH 2016 Test 3-61 Crash Test of Trinity Highway Products S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3.  The S-Q 8 Slip Base, Perforated, 3-Post Sign	
3-61 (1100C)	Support system (P41197-01) was impacted by a 2015 Kia Rio 4-door sedan at a velocity of 63.82 mph (102.71 km/h) and a CIA of 0°. Upon impact, the support structure yielded and did not make contact with the vehicle thereafter. There was no significant deformation or penetration into the vehicle's occupant compartment. The vehicle did not experience a measurable occupant impact velocity (OIV) or ridedown acceleration.	PASS
	The Trinity Highway Products S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3 Support Structure met all the requirements for MASH 2016 Test 3-61.	

		rage 4 or 5
Required Test Number	Narrative Description	Evaluation Results
3-62 (2270P)	Applus IDIADA KARCO Test No. P41198-01. Test Date August 24, 2021. Crash Test Report No. TR-P41198-01-NC for MASH 2016 Test 3-62 Crash Test of Trinity Highway Products S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3.  The S-Q 8 Slip Base, Perforated, 3-Post Sign Support system (P41198-01) was impacted by a 2015 Ram 1500 4-door passenger truck at a velocity of 61.07 mph (98.29 km/h) and a CIA of 0°. Upon impact, the support structure yielded and made contact with the vehicle then fell down. There was no significant deformation or penetration into the vehicle's occupant compartment. The vehicle did not experience a measurable occupant impact velocity (OIV) or ridedown acceleration.  The Trinity Highway Products S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3 Support Structure met all the requirements for MASH 2016 Test 3-62.	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:	KARCO Engineering, INC		
Laboratory Signature:	Antonio Reyes		ed by Antonio Reyes .28 14:39:16 -08'00'
Address:	9270 Holly Road, Adelanto, CA 92	2301	Same as Submitter
Country:	USA		Same as Submitter 🖂
	International Accreditation Services (IAS) ISO 17025 Accreditation Certificate #TL-371 Expires July 1, 2022		



#### 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.

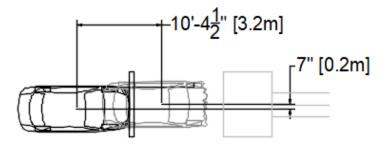
#### **FHWA Official Business Only:**

Eligibility Letter		
Number	Date	Key Words

### MASH 2016 Test 3-60 Summary



0.350 seconds 0.000 seconds 0.070 seconds 0.140 seconds 0.245 seconds



Test Agency	Applus IDIADA KARCC
Test Number	P41196-01
Test Designation	3-60
Test Date	7/19/21

EST ARTICLE	
Name / Model	· S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3
Type	.Support Structure
Mounting Height	. 88.5 in. (2.25 m)
Key Elements	.3.00" Anchor Sleve w/ Plate
	S-Q 8 Slip Base
	2.50" 12GA Signposts
	96X72, Aluminum Sign
Road Surface	Smooth, clean concrete

#### TEST VEHICLE

Type / Designation	1100C
Year, Make, and Model	2016 Kia Rio
Curb Mass	2,559.5 lbs (1,161.0 kg)
Test Inertial Mass	2,462.5 lbs (1,117.0 kg)
Gross Static Mass	2,620.1 lbs (1,188.5 kg)

#### Impact Conditions

impact velocity	.18.67 mpn (30.05 km/n)
Impact Angle	.0.0°
Kinetic Energy	28.7 kip-feet (38.9 Kilojoules)
Maximum KE Required	34.0 kip-feet (46.0 Kilojoules)*
Location / Orientation	2.8 in. (71 mm) From the
	Vehicle Centerline on the Driver
	Side

#### **Exit Conditions**

74:1	
Exit Velocity	16.05 mph (25.83 km/h)
Final Resting Position	.10.4 ft. (3.2 m ) Downstream
	0.6 ft. (0.2 m) Left
Vehicle Stability	Satisfactory
Maximum Roll Angle	.0.8 °
Maximum Pitch Angle	4.2 °
Maximum Yaw Angle	-3.5 °

\*MASH 2016 Table 2-5 has a recognized unit conversion discrepancy in the "Acceptable KE" (impact severity) maximum value for test 3-60. The value in the table is 41.0 kJ, however 34.0 kip-ft converts to 46.0 kJ.

Occu	pant	Risk	

Longitudinal OIV	15.7 ft/s (4.8 m/s)
Lateral OIV	0.3 ft/s (-0.1 m/s
Longitudinal RA	-2.0 g
Lateral RA	0.9 g
THIV	15.7 ft/s (4.8 m/s)
PHD	2.0 g
ASI	. 0.44

#### **Test Article Deflections**

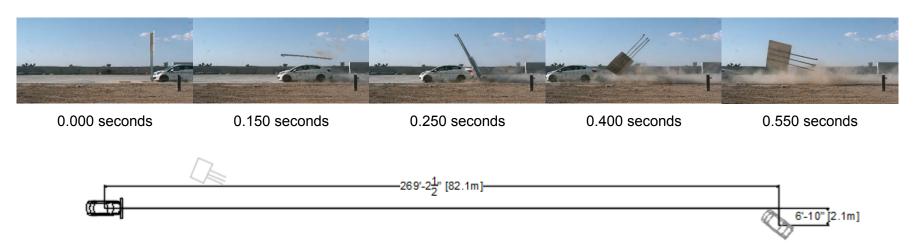
Debris Field (lateral)	0.6 ft. (0.2 m)
Vehicle Damage	
Vehicle Damage Scale	12-FD-1
CDC	. 12FDEW1
Maximum Deformation	None

Debris Field (longitudinal)...... 24.6 ft. (7.5 m)

Figure 2 MASH 2016 Test 3-60 Summary

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## MASH 2016 Test 3-61 Summary



GENERAL INFORMATION		
Test Agency	Applus IDIADA KARCO	
Test Number	P41197-01	
Test Designation	3-61	
Test Date	7/19/21	
TEST ARTICLE		
Name / Model	<u>S</u> -Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3	
Туре	Support Structure	
Mounting Height	88.5 in. (2.3 m)	
Key Elements	3.00" Anchor Sleeve w/ Plate S-Q 8 Slip Base	
	2.50" 12GA Signposts 96X72, Aluminum Sign	
Road Surface		
TEST VEHICLE		
Type / Designation	. 1100C	
Year, Make, and Model	2015 Kia Rio	
Curb Mass	2,561.7 lbs (1,162.0 kg)	
Test Inertial Mass	2,437.2 lbs (1,105.5 kg)	
Gross Static Mass	2,620.1 lbs (1,188.5 kg)	

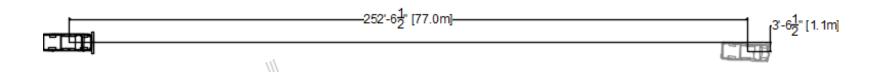
Impact Conditions	
Impact Velocity63.82 mph	(102.71 km/h)
Impact Angle0.0°	
Kinetic Energy 331.8 kip-f	eet (449.9 Kilojoules)
Minimum KE Required 288.0 kip-f	eet (390.0 Kilojoules)
Location / Orientation 2.0 in.(50 i	mm) From the Vehicle
Centerline	on the Driver Side
Exit Conditions	
Exit Velocity 61.31 mph	(98.67 km/h)
Final Resting Position269.2 ft. (8	2.1 m) Downstream
6.8 ft. (2.1	m) Right
Vehicle Stability Satisfactor	у
Maximum Roll Angle2.6 °	
Maximum Pitch Angle0.2 °	
Maximum Yaw Angle 1.4 °	

Occupant Risk	
Longitudinal OIV	.3.4 ft/s (1.0 m/s)
Lateral OIV	0.03 ft/s (0.0 m/s)
Longitudinal RA	0.0 g
Lateral RA	0.0 g
THIV	. Not Applicable
PHD	Not Applicable
ASI	0.22
Test Article Deflections	
Debris Field (longitudinal)	41.6 ft. (12.7 m)
Debris Field (lateral)	12.1 ft. (3.7 m)
Vehicle Damage	
Vehicle Damage Scale	12-FD-1
CDC	12FDEW1
Maximum Deformation	None

Figure 2 MASH 2016 Test 3-61 Summary

### MASH 2016 Test 3-62 Summary



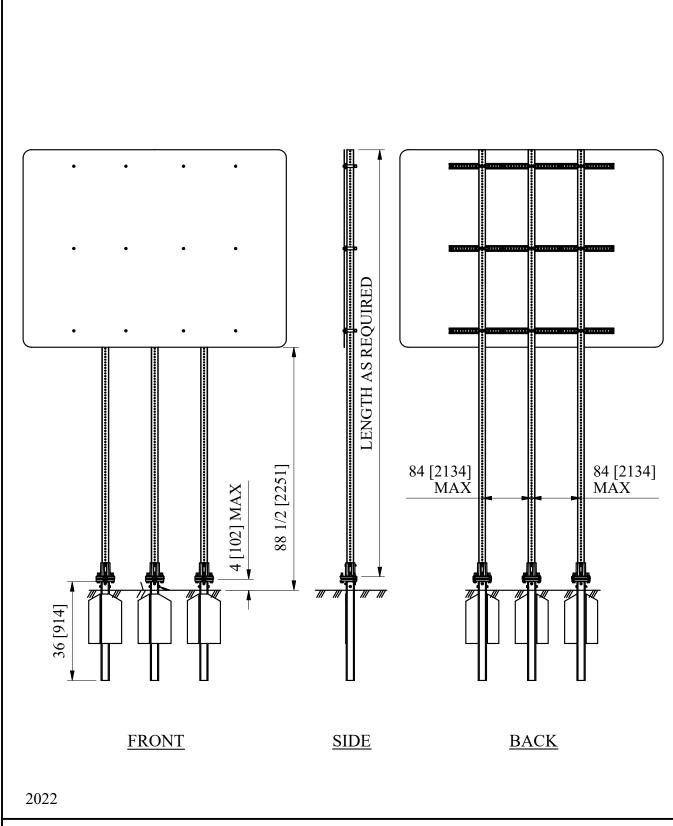


GENERAL INFORMATION	
Test Agency	Applus IDIADA KARCO
Test Number	P41198-01
Test Designation	3-62
Test Date	8/24/21
TEST ARTICLE	
Name / Model	S-Q 8 Slip Base, Perforated, 3-Post Sign Support, TL-3
Туре	Support Structure
Mounting Height	88.5 in. (2.3 m)
Key Elements	3.00" Anchor Sleeve w/ Plate S-Q 8 Slip Base
	96X72, Aluminum Sign
	2.50" 12GA Signposts
Road Surface	Smooth, clean concrete
TEST VEHICLE	
Type / Designation	2270P
Year Make and Model	2015 RAM 1500

Impact Conditions
Impact Velocity61.07 mph (98.29 km/h)
Impact Angle0.0°
Kinetic Energy 625.5 kip-feet (848.1 Kilojoules)
Minimum KE Required 594.0 kip-feet (805.3 Kilojoules)
Location / Orientation 3.5 in.(90 mm) From Vehicle
Centerline on the Driver Side
Exit Conditions
Exit Velocity 59.64 mph (95.98 km/h)
Final Resting Position252.5 ft. (77.0 m) Downstream
3.5 ft. (1.1 m) Right
Vehicle Stability Satisfactory
Maximum Roll Angle1.6 °
Maximum Pitch Angle3.2 °
Maximum Yaw Angle 1.4 °

Occupant Risk	
Longitudinal OIV	.1.4 ft/s (0.4 m/s)
Lateral OIV	-0.6 ft/s (-0.2 m/s)
Longitudinal RA	0.0 g
Lateral RA	0.0 g
THIV	. Not Applicable
PHD	Not Applicable
ASI	0.25
Test Article Deflections	
Debris Field (longitudinal)	73.8 ft. (22.5 m)
Debris Field (lateral)	17.9 ft. (5.4 m)
Vehicle Damage	
Vehicle Damage Scale	12-FD-1
CDC	. 12FDEW1
Maximum Deformation	None

Figure 2 MASH 2016 Test 3-62 Summary



### S-Q 8 SLIP BASE SIGN SUPPORT SYSTEM - 3-POST



SSSXXa	
SHEET NO.	DATE
1 of 4	1/28/2022

#### **INTENDED USE**

The S-Q 8 perforated steel tubular sign support system is a three (3) post sign support slip base system. The system utilizes drivable anchor sleeves with a soil bearing plate in standard soil. The sign support system was successfully crash tested to TL-3 in accordance with MASH 2016 guidelines. This system meets the requirements of the AASHTO *LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 1st Edition.* 

#### **FEATURES**

The S-Q 8 perforated steel tubular sign support system consists of three (3) 2.50 inch 12 GA square perforated steel signposts and three (3) 3.00 inch 7 GA square steel anchor sleeves with soil bearing plate (sheet 3 of 4). The slip base system consists of a slip base stub, bolt keeper plate and slip base casting. The slip base stub is secured to the anchor sleeve with two (2) Ø3/8" shoulder bolts and the slip base casting is secured to the slip base stub with three (3) Ø1/2" bolts and nuts. The signposts slide into the slip base castings and are secured in place by two (2) Ø3/8" shoulder bolts and nuts. The material for the anchor sleeves conforms to ASTM A500 and the soil plate steel conforms to ASTM A36. The pre-coated steel material for the perforated signposts conforms to ASTM A653. The exterior surface of the signposts is coated with minimum 0.5 mils clear acrylic polymer.

#### **ELIGIBILITY**

The S-Q 8 3-Post perforated steel slip base sign support system has been tested to MASH 2016 Test Level 3 and is eligible for Federal reimbursement by FHWA.

FHWA Eligibility Letter(s): SS-XXX dated for MASH 2016 Test Level	FHWA Eligibility Letter(s): SS-XXX dated	for MASH 2016 Test Level 1
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#### **REFERENCES**

Manual for Assessing Safety Hardware (MASH), American Association of State Highway and Transportation Officials (AASHTO), 2016.

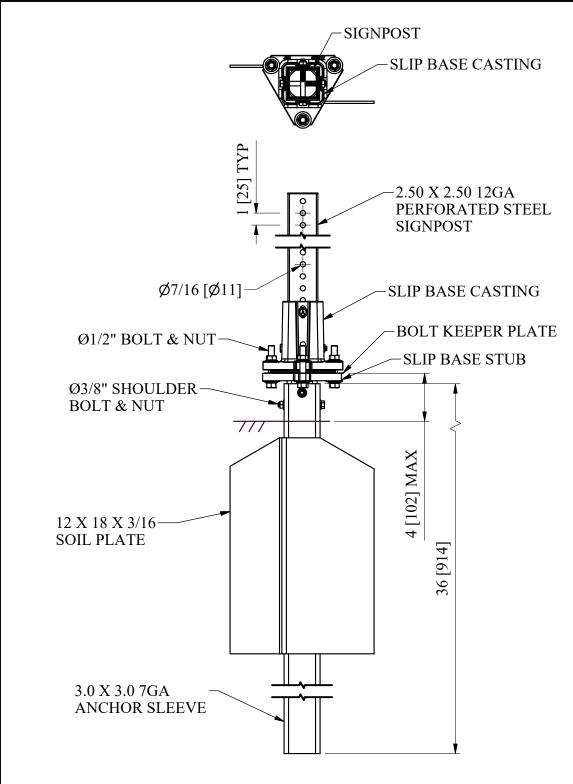
#### **CONTACT INFORMATION**

15601 Dallas Parkway, Suite 525 Addison, TX 75001 Telephone: (888) 323-6374 https://trinityhighway.com

### S-Q 8 SLIP BASE SIGN SUPPORT SYSTEM - 3-POST

SSSXXa	
SHEET NO.	DATE
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SIGNPOST/ANCHOR SLIP BASE CONNECTION

### S-Q 8 SLIP BASE SIGN SUPPORT SYSTEM - 3-POST



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