U.S. Department
of Transportation

**Federal Highway
Administration**

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

May 4, 2012

In Reply Refer To:
SS-175

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

Dear Mr. Kirchgesner:

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:	Surface Mount Slip Bases SMSB10-10-G and SMSB8-10-G
Type of system:	Triangular Slip Base Small Sign Support for Perforated Square Steel Tube (PSST) posts
Test Level:	NCHRP Report 350 Test Level 3
Testing conducted by:	N/A
Date of request:	June 28, 2011

Decision:
The following devices are eligible, with details provided below

- Surface Mount Slip Bases SMSB10-10-G and SMSB8-10-G

Based on a review of the information and calculations submitted by the manufacturer certifying the device described herein meets the crash test and evaluation criteria of the National Cooperative Highway Research Program (NCHRP) Report 350, 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.

Requirements
To be found eligible for Federal-aid funding, roadside safety devices should meet the crash test and evaluation criteria contained in the National Cooperative Highway Research Program (NCHRP) Report 350 or the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH).

Description

You requested our review of two new slip base components that would work with your NCHRP Report 350 compliant Slip Base Tops and would use your Redi-Torque Hardware. The 8-inch version has the same geometry as your existing 8-inch Slip Base Tops, and the 10 3/8-inch version that has the same geometry as your existing 10 3/8-inch Slip Base Tops. You provided calculations (enclosed for reference) that show that both of the Surface Mount Slip Bases are stronger than the posts that they would support. They would be secured to flat concrete surfaces using standard concrete anchors that would be required to exceed the load capacities of the slip base & sign assembly to ensure proper functionality of the slip bases. The surface mount allows for installations on top of concrete medians instead of coring a large hole into them, when a slip base is desired in place of other sign post mounting devices. This mounting system is similar to the rigid foundations used when larger sized slip bases are crash tested.

Summary and Standard Provisions

Therefore, the systems described above and detailed in the enclosed drawings are eligible for reimbursement and may be installed 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 NCHRP Report 350 criteria 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 crash test and evaluation criteria of the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of eligibility is designated as number SS-175 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.

Sincerely yours,

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

Enclosures

WIND LOAD

In accord with "Standard Specification for STRUCTURAL Sign Supports for Highway Signs, Luminaries, Traffic Signals". 2001

Design Wind Pressure, $Pz = 0.00256 KzGV^2 IrCd$

Wind Variables :		
Centroid Sign Height, z =	10 ft	
Height and Exposure Factor, Kz =	0.87	(ht <16.4 ft, Eq C 3-1, Table 3-5, p. 3-11)
Gust Factor, G =	1.14	(p. 3-12)
Wind Velocity, W =	90	mph (figure 3-2, p. 3-8,9)
Importance Factor, Ir =	0.71	(table 3-2, p. 3-10)
Sign Length, L =	4 ft	
Drag Coefficient, Cd sign =	1.25	(conservative based on L/W ration)(table 3-6, p. 3-17)
Drag Coefficient, Cd post =	1.25	(table 3-6, p. 3-17)
Wind Pressure Sign, Pzs =	18.3 psf	
Wind Pressure Post, Pzp =	18.3 psf	

Moment on Base from Post	
Width of Post, wp =	3 in
Mpost = $1/2*wp/12*Pzp*(z-L/2)^2$ =	146 ft-lb

MAXIMUM SIGN AREA CALCUALTIONS

Post

Post 2 1/2"Φ x 0.276" wall Sch. 80 Pipe

ASTM 1011 Fy =	60000 psi	
Section Modulus of Post, S =	1.27 in3	
Yield Stress with 1/3 increase for Wind, Fby = $1.33*Fy$ =	79800 psi	(1/3 stress ▲ per table 3-1, p. 3-3)
Max. Moment on Post = $Mp = S*Fby/12$ =	8446 ft-lb	
Max Allowable Moment on Sign, $Ms = Mp - Mpost$ =	8299 ft-lb	
Max. Sign Area = $Ms/(Pzs*z)$ =	45 ft²	

Forged Top Receiver

See Xcessories Squared Drawing SB10C-278RD-G

Ductile Iron Class 65-45-12, Fy =	45000 psi	
Thickness of Cast Piece, t =	0.27 in	
Inside Dimension of Cast Piece, d1 =	3.00 in	
Outside Dimension of Cast Piece, d =	3.54 in	
Section Modulus of Cast Piece, $S = \pi\cdot(d^4 - d1^4)/(32\cdot d)$ =	2.11 in³	
Yield Stress with 1/3 increase for Wind, Fby = $1.33*Fy$ =	59850 psi	(1/3 stress increase per table 3-1, p. 3-3)
Max. Moment on Reciever = $Mp = S*Fby/12$ =	10518 ft-lb	
Max Allowable Moment on Sign, $Ms = Mp - Mpost$ =	10372 ft-lb	
Max. Sign Area = $Ms/(Pzs*z)$ =	57 ft²	

Forged Base Plate

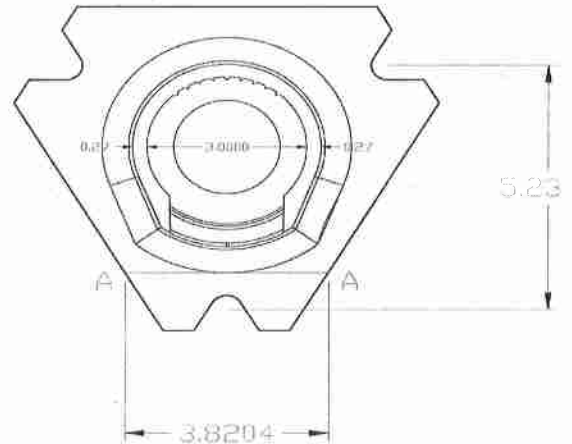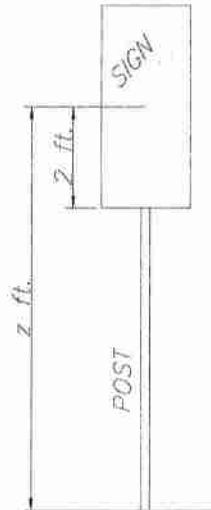|		
Ductile Iron Class 65-45-12, Fy =	45000 psi	
Dist from Bolt to Critical Section ⊥ to Sign, a =	0.796 in	
Dist Between Bolts ⊥ to Sign, b =	5.235 in	
Width of Plate at Critical Section, w =	3.82 in	
Thickness of Forged Base Plate =	0.75 in	
Section Modulus at Critical Section, $S = 1/6*w*t^2$ =	0.36 in³	
Yield Stress with 1/3 increase for Wind, Fby = $1.33*Fy$ =	59850 psi	(1/3 stress ▲ per table 3-1, p. 3-3)
Max Allowable Moment on Plate, $Mpl = Fby*S$ =	21434 in-lb	
Max. Moment on Reciever = $Mp = (Mpl*b/a)/12$ =	11747 ft-lb	
Max Allowable Moment on Sign, $Ms = Mp - Mpost$ =	11601 ft-lb	
Max. Sign Area = $Ms/(Pzs*z)$ =	64 ft²	

1/2" Φ BOLTS

Grade 8 Redi-Torque, Fy =	130000 psi
Bolt Diameter at Threads = D =	0.45 in
Area of Bolt, A = $\pi D^2/4$ =	0.159 in^2
Allowable Yield Load on Bolt, P = 1.33*Fy*A =	27499 lbs
Allowable Yield Moment on Bolt Assembly, Mbolt = P*b /12 =	11996 ft-lb
Max Allowable Moment on Sign, Ms = Mbolt - Mpost =	11850 ft-lb
Max. Sign Area = Ms/(Pzs*z) =	**65** ft^2

Bottom Triangular Plate Plate
See Xcessories Squared Drawing SMSB10-10-G

ASTM A572, Gd 50 = Fy =	50000 psi
Dist from Bolt to Critical Section ⊥ to Sign, a =	1.99 in
Dist Between Bolts ⊥ to Sign, b =	5.235 in
Width of Plate at Critical Section, w =	5.2 in
Thickness of Base Plate =	1.00 in
Section Modulus at Critical Section, S = 1/6*w*t^2 =	0.87 in^3
Yield Stress with 1/3 increase for Wind, Fby = 1.33*Fy =	66500 psi	(1/3 stress▲ per table 3-1,p. 3-3)
Max Allowable Moment on Plate, Mpl = Fby*S =	57633 in-lb
Max. Moment on Reciever = Mp = (Mpl*b/a)/12 =	12634 ft-lb
Max Allowable Moment on Sign, Ms = Mp - Mpost =	12488 ft-lb
Max. Sign Area = Ms/(Pzs*z) =	**68** ft^2

3/8" Fillet Weld - Bottom Plate to Tube
Weld E70XX Electrodes

Weld Strength, Fy =	70000 psi
Tube Size, b =	3 in
Section Modulus of Weld, S = $b^2+b^2/3$ =	12 in^3/in
Weld size, w =	0.375 in
Weld Strength, W = 1.33*0.707*w*Fy =	24683 lb-in/in
Allowable Yield Moment on Weld, Mw = W*S/12	24683 ft-lb
Max Allowable Moment on Sign, Ms = Mw - Mpost =	24537 ft-lb
Max. Sign Area = Ms/(Pzs*z) =	**134** ft^2

3"x3"x7ga. Bottom Tube

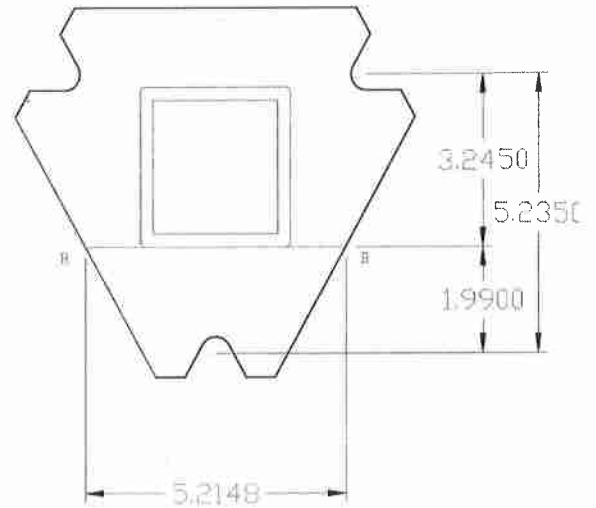|	
ASTM A500 Grade C, Fy =	50000 psi
Section Modulus of Tube, S =	1.897 in^3
Yield Stress with 1/3 increase for Wind, Fby = 1.33*Fy =	66500 psi	(1/3 stress increase per table 3-1,p. 3-3)
Max. Moment on Post = Mp = S*Fby/12 =	10513 ft-lb
Max Allowable Moment on Sign, Ms = Mp - Mpost =	10367 ft-lb
Max. Sign Area = Ms/(Pzs*z) =	**57** ft^2

Bottom Square Plate Plate

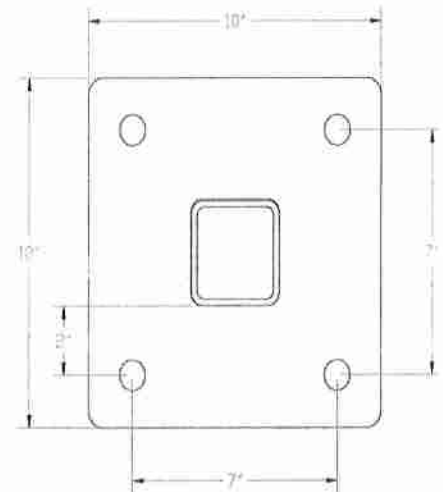|	
ASTM A572, Gd 50 = Fy =	50000 psi
Dist from Bolt to Critical Section ⊥ to Sign, a =	2.00 in
Dist Between Bolts ⊥ to Sign, b =	7 in
Width of Plate at Critical Section, w =	10 in
Thickness of Base Plate =	0.75 in
Section Modulus at Critical Section, S = 1/6*w*t^2 =	0.94 in^3
Yield Stress with 1/3 increase for Wind, Fby = 1.33*Fy =	66500 psi	(1/3 stress▲ per table 3-1,p. 3-3)
Max Allowable Moment on Plate, Mpl = Fby*S =	62344 in-lb
Max. Moment on Reciever = Mp = (Mpl*b/a)/12 =	18184 ft-lb
Max Allowable Moment on Sign, Ms = Mp - Mpost =	18038 ft-lb
Max. Sign Area = Ms/(Pzs*z) =	**99** ft^2