



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

400 Seventh St., S.W.
Washington, D.C. 20590

March 7, 1996

Refer to: HNG-14/SS-59

Mr. Mark Granger
Chicago Heights Steel
211 E. Main
P.O. Box 129
Chicago Heights, Illinois 60411

Dear Mr. Granger:

This is in response to your February 7 letter requesting the Federal highway Administration's (FHWA) acceptance of your company's "Safety Splice" for u-channel sign supports. Accompanying your letter were a videotape and a copy of the Texas Transportation Institute report "Testing and Evaluation of the Chicago Heights Steel Breakaway Sign Support" dated January 1996. Two low-speed tests on supports embedded in soil are covered in the videotape and the report.

Requirements for breakaway supports are those in the American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Structural Support for Highway Signs, Luminaires and Traffic Signals. We also recognize the testing and evaluation guidelines found in the National Cooperative Highway Research Program Report number 350 Recommended Procedures for the Safety Performance Evaluation of Highway Features.

A drawing of the "Safety Splice" and a drawing showing installation details are enclosed. The 356-mm square by 6.3-mm thick soil plates are bolted on the stubs and are an integral part of the breakaway support design for use in weak soils. The full-scale crash testing of the spliced triple-post, 5.9-kg/m, 414-Mpa (60-ksi) steel sign support is summarized in the table below. The three 915-mm long support stubs were driven into the strong (S-1) soil leaving 102 mm of the stubs exposed. In the weak (S-2) soil test the stubs were 1525 mm long with 102 mm of each stub exposed. The tops of the soil plates were set 153 mm below the ground line. The stubs were spaced 457 mm on center. The top elements of the sign supports overlaps the stubs by approximately 150 mm, and were connected to the stubs by two 5/16-inch x 2-inch (8-mm x 51 mm) HS Grade 9 steel bolts. With each bolt there were a Grade 9 cut washer, two spacers, a retaining washer, and a self-locking flange nut.

The splice bolts were spaced 102 mm on center. The 25.4-mm square, 9.5-mm thick spacers are each punches with an 11-mm hole. Two spacers are placed back to back at each splice bolt location between nested u-channels.

Test Summaries		
Test Number	270687-CHS5	270687-CHS6
Vehicle Mass	820 kg	820 kg
Impact Speed	35.6 km/h	35.2 km/h
NCHRP 350 Soil Type	Standard	Weak
Soil Bearing Plates Used?	No	Yes
Vehicle Velocity Change	4.2 m/s	4.69 m/s
Occupant Impact Speed	4.2 m/s	4.2 m/s
Failure Mode	All bolts broke	All bolts broke
Stub Height	102 mm	102 mm

These results meet the change in velocity and stub height requirements of FHWA and AASHTO. Extensive testing on spliced 413.7-Mpa (60-ksi) u-channel sign supports show that the low-speed tests are the “worst case” compared to high-speed tests. Thus, we do not believe high-speed tests are necessary. Therefore, your company’s u-channel sign supports weighing up to and including 5.9 kg/m (4 pounds per foot), as described above and shown in the attached drawings, may be used on the National highway System, (NHS) when requested by a State, in installations using one, two or three supports within a 2.1-m span in standard soil or with soil plates in weak soil.

Our acceptance is limited to the breakaway characteristics of your sign supports with “Safety Splices” and does not cover their structural features. Presumably, you will supply potential users with sufficient information on structural design and installation requirements to ensure proper performance. We anticipate that the States will require certification from Chicago Heights Steel that the hardware furnished will have essentially the same geometry, Chemistry and mechanical properties as that used in the tests and that it will meet the FHWA change in velocity requirements.

We understand that you are investigating whether your Safety Splice can be patented. If you do obtain a patent on it, it will be considered a proprietary product. For proprietary products to be used in Federal-aid highway projects, except exempt, non-NHS projects: (a) they must be supplies through competitive viding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with 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, a copy of which is enclosed.

Sincerely yours,

Seppo I. Sillan, Acting Chief
Federal Aid and Design Division

2 Enclosures

Geometric and Roadside Design Acceptance Letter SS-59

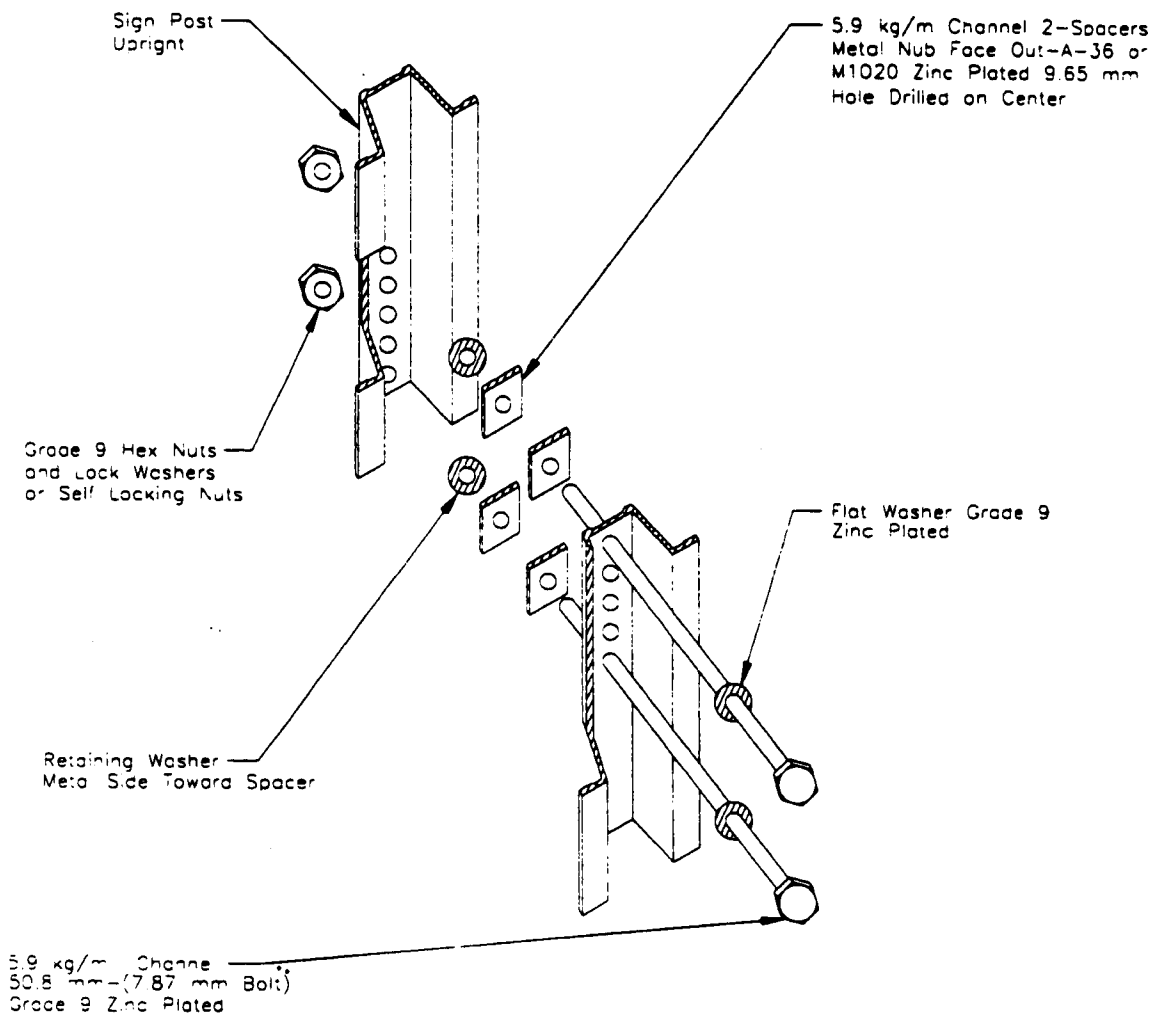


Figure 2. Details of the lap splice connection.

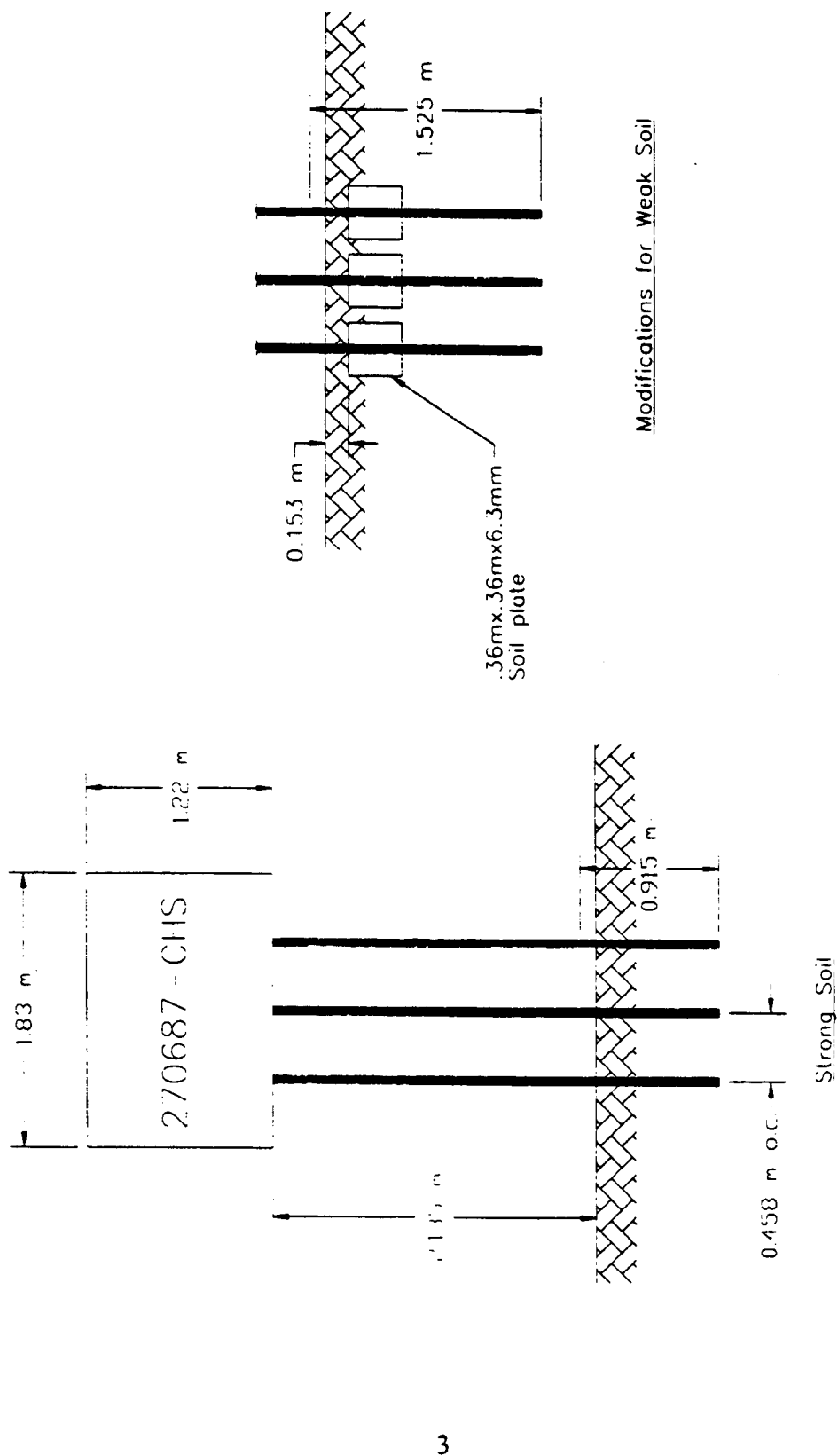


Figure 1. Details of the Chicago Heights Steel break-away sign support installation.