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## Statement of Certification

### **Laboratory Tests on TFC Hillside Washers “Bracer” and Standard Market Available Hillside Washers using Stress-Lok Washers**

This is to certify that we have conducted comprehensive laboratory testing on your TFC “Bracers #1 and #2” hillside washers with ridges, serration, on the curvature of the hillside washers and off-the-shelf market available hillside washers. Tests were performed at 45 degree angle with the main structural member. Stress-Lok washers were used on all tests. The objective of the testing program was to establish the load carrying capacities and the failure modes. This work was conducted at the Structural Laboratories of the Civil Engineering Department of Mississippi State University under my direction and supervision.

The test results confirmed previous findings made on Triangle Fasteners Corporation “Bracer” hillside washers. Triangle Fasteners hillside anchors having ridges, serration, on the curvature of the hillside washer with Stress-Lok washers were found to be superior to the standard off-the-shelf market available hillside washers. They carried higher loads with no failure to neither the hillside anchors, “Bracers”, nor the beam/column test sections. These tests confirmed also that cast iron hillside washers should not be used under any circumstances because of the sudden failure at unpredictable loads. However, ductile iron, market available standard hillside washers with Stress-Lok washers can be used with caution because local failures could and will occur. Tested “Bracers #1 and #2” with Stress-Lok washers exceeded the load carrying capacity of tested market available ductile iron hillside washers.

Procedures and calculations established in the literature for the design of x-bracing anchorage can be used with confidence when specifying and selecting ductile iron “Bracers #1 and #2” hillside washer using Stress-Lok washers. Stress-Lok washers were also found to be superior to standard high strength flat washers in load distribution, deformation, and hindering localized failure to the anchorage of the x-bracing rod.

Respectfully submitted by,



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