Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY
COLLEGE OF NATURAL RESOURCES

DEPARTMENT OF WOOD SCIENCE & FOREST PRODUCTS

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May 24, 2005
Edward Rys Jr.
Lenovers Pro Bldg. Products
13420 Wayne rd
Livonia Mich. 48150

Dear Ed,

This letter is a report on the test of a QS Pro deck guardrail system we conducted on April 28, 2005 at the Brooks Forest Products Center, Department of Wood Science and Forest Products, Virginia tech, Blacksburg, VA.

The test involved applying a horizontal force to the railing, 42 inches above the deck surface (43.5 in. above the top of the joists), and measuring the load and deflection to failure. The procedures in AC-174 were used. The load was applied at the quarter points on the top rail. A 50,000 pound capacity MTS servo-hydraulic testing machine with computer data acquisition was used to apply the load. The test arrangement is shown on Photo 1. All wood elements were ACQ treated southern yellow pine in the wet moisture condition. All bolts were ½ in. diameter and washers were used under the head and nut. All screws for constructing the deck were 3 in. long #10 stainless steel (SS).

The specimen consisted of an 8 ft long QS Pro railing section attached between two 4x4's posts with the QS Pro cast zinc connector. The rail was an extruded aluminum “I” section covered with a white vinyl sleeve. The pickets, post covers and lower rail were also white vinyl.

The posts were connected to a 2x8 wood joists deck system. The system was rigidly fastened to the laboratory floor (Photo 2). Each 4x4 was attached to the joist with one Simpson HD2A hanger located 1.5 in. below the top of the joist and one lower bolt through the band joist and the post located 2- ½ in. above the bottom of the band joist. The Simpson HD2A connector uses two bolts through the sides of the joist and one bolt through the face of the hanger, post and the band joist. The posts were “inside” the band joist as shown in Photo 2. Three SS screws were used to connect the band to each joist.

The AC-174 requirements were followed and a horizontal load was applied at 42 in. above the deck surface. The load was applied at the quarter points on the top rail, 2 ft away from each post. The load was applied at rate of 1/2" in. of ram movement per minute up to failure. A roller chain and a spreader bar were used to apply the load from the testing machine to the specimen.

Figure 1 shows the load vs. deformation curve. The specimen failed at a load of 1153 pounds or 576 pounds per post. The failure mode was snapping of one of the posts at the deck surface. After the failure of the post, the QS Pro top rail immediately returned to its initial shape and did not appear to be damaged by the test indicating that the top rail was in the elastic range of its response. The cast zinc connector also appeared to be undamaged after the test. The AC-174 requirement of 500 lbs per post was met and exceeded by the QS Pro rail system.

If you have any questions regarding this report please contact me.

Sincerely yours,

Joseph Loferski, Professor
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Virginia Tech,
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Photo 1: Test set-up showing rail system and test machine.

Photo 2: Test in progress showing the deflection of the rail and post just before failure.

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Photo 3: Post failure in bending just above joist.

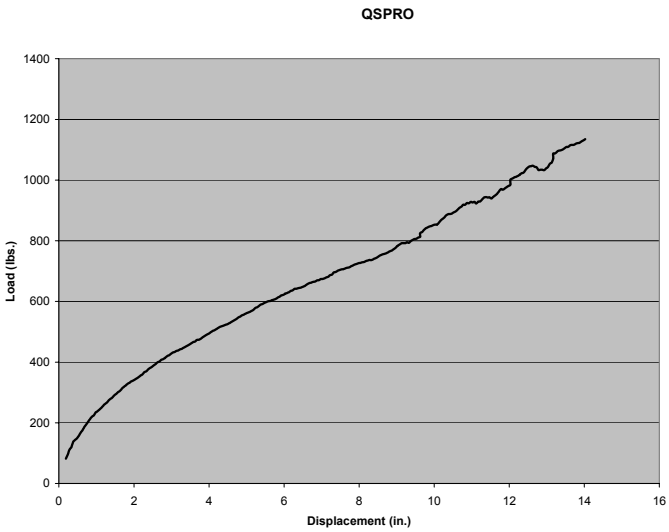

Figure 1 Load-displacement curve of QS Pro rail test