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EVALUATION OF FASCIA MOUNT BASE SHOE

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DESCRIPTION AND PURPOSE

R & B Wagner, Inc. requested Stork Technimet to evaluate a base shoe used in commercial railings. This base shoe was a 4 inch tall, 2.5 inch wide aluminum channel. The base shoe was five feet long, and had five countersunk holes through one side, spaced 12 inches apart. This base shoe was designed to be used with a half-inch thick, tempered glass panel as an infill. The infill can be secured to the base shoe using plastic isolators and Panel Grips™, or can be grouted in place. In this case, it was requested to evaluate the base shoe when mounted to a wall, or "fascia mounted," and using panel grips.

The test of this base shoe was to be according to the procedure listed in ASTM E 935, "Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings." The horizontal deflection was measured at the top of the rail, and evaluated against the criteria in ASTM E 985, "Standard Specifications for Permanent Railing Systems and Rails for Buildings." Stork Technimet previously evaluated similar systems with the results of the most recent testing presented in Stork Technimet Report No. 0804-23452, dated May 2, 2008.

CONCLUSIONS

Three base shoes were tested with a steel railing and one with a glass panel. Four samples were tested according to ASTM E 935 with a load applied at either the top-center or the corner of the rail. At the test load of 365 pounds, the steel rail deflected 1.895, 1.978, and 1.761 inches. The allowable deflections were 2.42, 2.42 and 3.58 inches, respectively. The glass panel deflected 2.035 inches at 365 pounds with an allowable deflection of 2.38 inches. These were less than the maximum allowable.

The residual deflections of the steel rail after releasing the 365 pound test load were 0.198, 0.291, and 0.207 inches. The allowable residual deflections were 0.483, 0.483, and 0.5 inches, respectively. The residual deflection of the glass panel after releasing the 365 pound test load was 0.099 inches with an allowable of 0.475 inches. These were less than the maximum allowable.

PROCEDURE AND RESULTS

Four aluminum base shoes were tested in accordance with ASTM E 935 except that a steel railing was substituted for the typical glass panel for three of the tests. R & B Wagner, Inc. provided the steel railing, glass panel, aluminum base shoes, and the Panel Grips™ and performed the installations. The base shoes were bolted to a steel plate, which was anchored to a concrete slab. A welded steel railing or glass panel was installed in each base shoe using four Panel Grips™ set at approximately 12 inches on center.

For each test, load was applied to the steel railing using a winch, and the load was measured with a load cell. The displacement was measured as near as practical to the load application point with a "String Pot" or Linear Displacement Transducer (LDT). The load was applied and the deflection was measured at a height of approximately 43 inches for the steel railing, and 42 inches for the glass panel. This approximates the top of a typical railing. Photographs of the test setups are provided as Figures 1 through 3.

At the start of each test, a preload of 180 pounds was applied and held for two minutes. The preload was then released to half, or 90 pounds. This was considered to be the zero point per ASTM E 935. The load was then applied in increments of approximately 100 pounds using the winch until the desired load was achieved. Each load was held for approximately 2 minutes. The samples were loaded to a maximum of 365 pounds according to ASTM E 935, and then the load was reduced to 90 pounds to determine the residual displacement. In addition to the requirements of ASTM E 935, the samples were also overloaded to 550 pounds. Three samples were loaded with the load centered at the midspan, and one sample was loaded with a load near the corner, as outlined in ASTM E 935.

Load and displacement data were recorded continuously with an eDAQ portable data acquisition system. The load-displacement plots for each sample are included as Figures 4 through 7. The displacements at 365 pounds varied from 1.761 inches to 2.035 inches, and the residual deflections ranged from 0.099 inches to 0.291 inches. These values of deflection and residual deflection were within the allowable range. The results of the tests and the deflection criteria defined in ASTM E 985 are listed in Table 1.

If you have any questions concerning the contents of this report, please contact me. It should be noted that it is our policy to retain components and sample remnants for 30 days from August 29, 2008, after which time they will be discarded. If you would like to make alternate arrangements for disposition of the material, please let me know. This project shall be governed exclusively by the General Terms and Conditions of Sale and Performance of Testing Services by Stork Technimet, Inc. a Wisconsin business corporation d.d. March 22, 2004. In no event shall Stork Technimet, Inc. be liable for any consequential, special or indirect loss or any damages above the cost of the work.

Respectfully submitted,

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Table 1

Load-Deflection Test Results

Test	Infill	Load Point	Deflections (inches)				
			At 365 lbs.	Allowable at 365 lbs.	Residual*	Allowable Residual	At 550 lbs.
1	Steel	Middle	1.895	2.42	0.198	0.483	3.314
2	Steel	Middle	1.978	2.42	0.291	0.483	3.455
3	Steel	Corner	1.761	3.58	0.207	0.5	3.209
4	Glass	Middle	2.035	2.38	0.099	0.475	3.838

*** Residual measured after loading to 365 pounds and releasing to 90 pounds.**

Fig. 1 - An overall view of the first test setup is shown. The load was applied at the center of the of the substitute steel rail.

Fig. 2 - An overall view of the second test setup is shown. The load was applied near the corner of the of the substitute steel rail.

Fig. 3 - An overall view of the glass panel test setup is shown. The load was applied at the center of the top edge of the glass panel. Wood blocks were used to distribute the clamping pressure and prevent fracture of the glass.

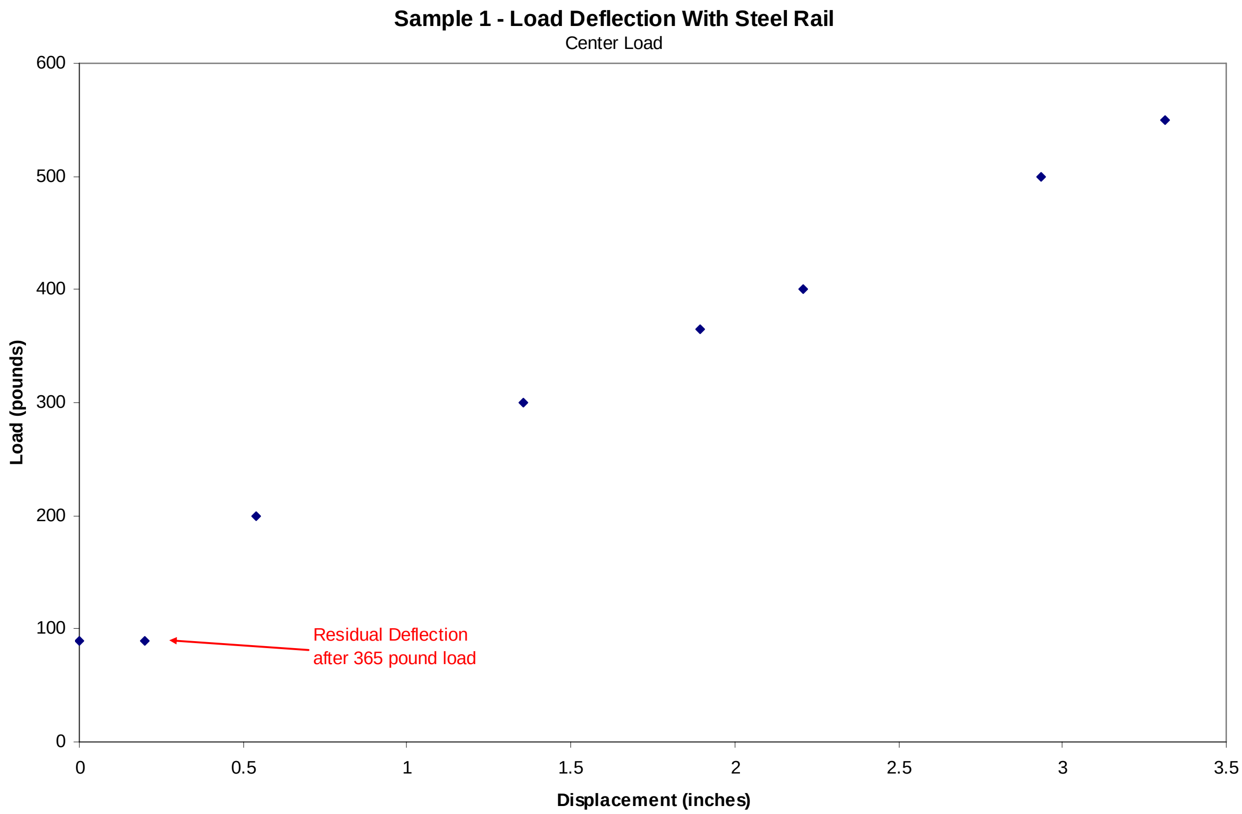

Fig. 4 - A plot of load versus deflection for steel rail sample one with center loading.

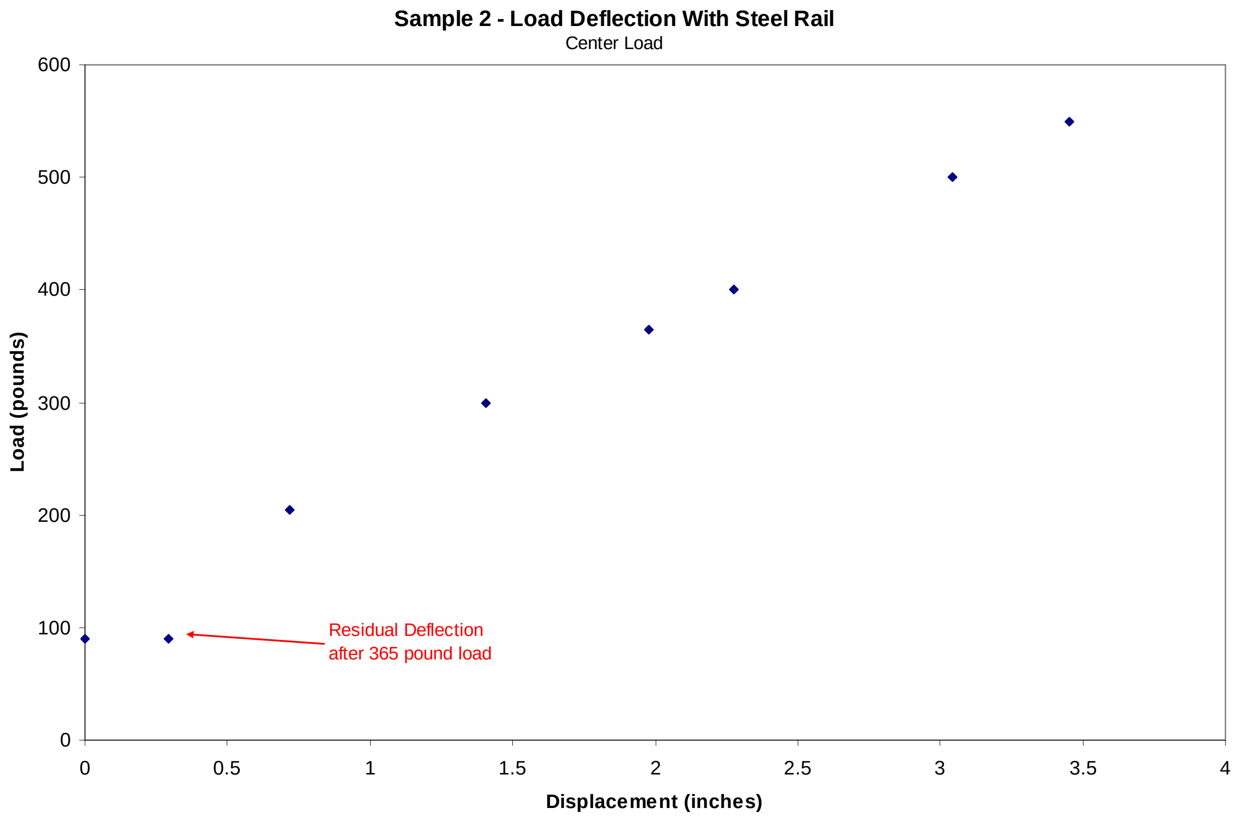

Fig. 5 - A plot of load versus deflection for steel rail sample two with center loading.

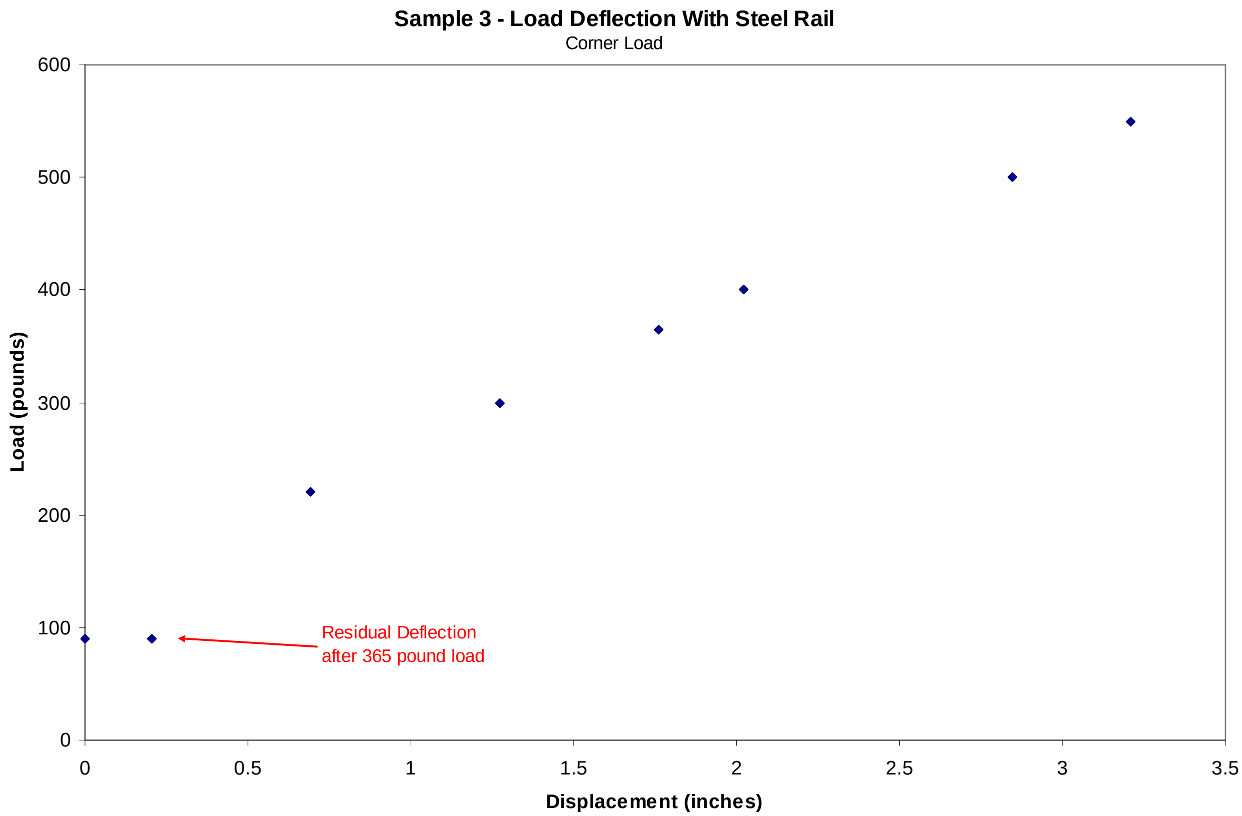

Fig. 6 - A plot of load versus deflection for steel rail sample three with corner loading.

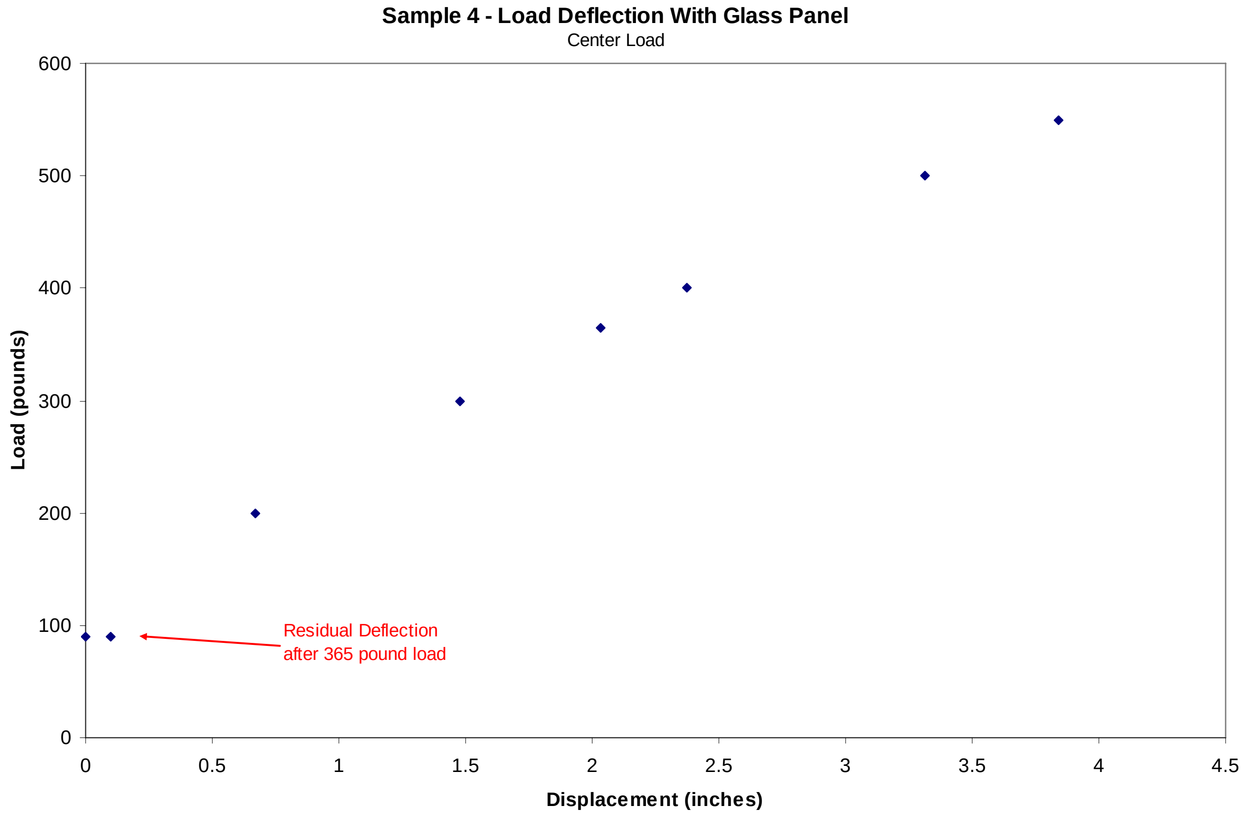

Fig. 7 - A plot of load versus deflection for glass panel sample four with center loading.