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GLASS RAILING STRUCTURAL TEST REPORT

PREPARED BY: Mario Labot, PE

DATE: March 27, 2018

REVISIONS:

PREPARED FOR: Windloch
467 Brook Avenue, Unit C
Deer Park, NY 11729





Glass Railing Structural Test

On March 23, 2018 I visited the facilities of Windloch at Deer Park, Long Island, New York And witness the testing of a glass railing. The railing was already assembled and installed when I arrived the facilities. Testing was conducted by Mr. Yoav Ben-Shimon.

Brief Description of the Specimen:

Dimensions are 107 3/4" long and 42" high from top of the Stainless Steel railing to the bottom of the Aluminum shoe. Composed of two tempered glass panes 53 1/2" wide with approximately 3/4" joint between them. Glass was dry glazed to the (1 piece) Aluminum shoe, (1 piece) fabricated 1 1/2" X 1 1/2" Stainless Steel top rail was wet glazed to the glass. Engagement of glass to the shoe and top rail are approximately 3" and 3/4" respectively. The concrete anchor's sizes and spacings are not visible and were not verifiable, Windloch verbally verified that they are Simpson Bolt 2, 3/8" diameter, 3 1/2" embedment spaced about 3" from ends and 12 3/4" on center, Concrete strength is 3000 PSI, NWC as furnished by Windloch.

As verbally verified by Windloch, items that are not visible complies with glass railing shop drawings 1 and 2, and the shoe with extrusions drawings 900041 and 900042 all are attached with this report.

Testing Procedure:

- A. 200 pounds concentrated load parallel and perpendicular to the plane of glass.
Wood testing jig was attached to the top of the top S/S rail, with the use of slings, shackles, tackle and tension meter the assembly was bolted to the floor for 1 and 2, to the wall for 3 and 4. Tackle was tightened, and loads were measured using a tension meter (AWS Model 440)

A1. 200 pounds concentrated Axial load applied at top of railing, at center of glass pane, downward load.

- A1. a. Applied 50% of the load and release.
A1. b. Applied continued increasing concentrated load at 15% increment up to 200 Pounds, 2- minute pause at every increment.
A1. c. Deflection manually measured at the end of test and after load was released.

A2. 200 pounds concentrated Axial load applied at top of the railing, at joint of the two panes, downward load.

- A2. a. Applied continued increasing load at 15% increment up to 200 pounds 2- minute pause at every increment.
A2. b. Deflection manually measured at the end of test and after the load was released.

A3. 200 pounds concentrated lateral load applied at top of railing, at center of glass pane, Perpendicular to the plane of glass pane.

- A3. a. Applied 50% of load and release
A3. b. Applied continued increasing concentrated load at 15% increments up to 200 Pounds, 2- minute pause at every increment
A3. c. Deflection manually measured at the end of test and after the load was released.

A4. 200 pounds concentrated lateral load applied at top of railing, at joint of the two panes Perpendicular to the plane of the glass pane.



Sheet 2 of 8

- A4. a. Applied continued increasing load at 15% increment up to 200 pounds
2- minute pause at every increment.
A4. b. Deflection manually measured at the end of test and at after the load was released.

B. Wind Load Test:

S/S top rail was removed, sling was wrapped around at one of the glass pane at its middle height. With the use of rope, sling, shackles, tackle and load cell, the assembly was bolted to a wall. The tackle was tightened to apply the load, load was measured using digital meter (Optima Model 901A)

Loads perpendicular to the plane of glass were applied in increasing increment equivalent to 7.5 PSF up to the maximum load of 80 PSF, Deflections were manually measured every after the application of incremental loads and at the end of the test after the maximum load was released. There were 2- minute pause after each incremental load was applied. Lateral load in pounds were applied in the following sequence.

B1. 117
B2. 234
B3. 351
B4. 468
B5. 585
B6. 703
B7. 937
B8. 1014
B9. 1093
B10. 1170
B11. 1248

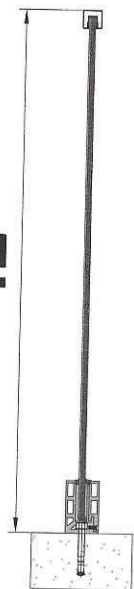
For results of the tests refer to Tables 1 and 2 in sheets 7 and 8

CONCLUSION:

The railing assembly withstand the 200 pounds concentrated loads at top of railing applied vertically and perpendicular to the plane of glass.

The railing assembly withstand the maximum wind load of 80 PSF applied perpendicular to the plane of glass.

42



42

53 $\frac{1}{2}$ 107 $\frac{3}{4}$

TEST A2

TEST A1

REMOVED AT TEST B

TEST A4

53 $\frac{1}{2}$

TEST A3

3
4

SWING

TEST B1 → B11

42

3

12 $\frac{3}{4}$ 12 $\frac{3}{4}$ 12 $\frac{3}{4}$ 12 $\frac{3}{4}$ 12 $\frac{3}{4}$ 12 $\frac{3}{4}$ 12 $\frac{3}{4}$ 12 $\frac{3}{4}$

3

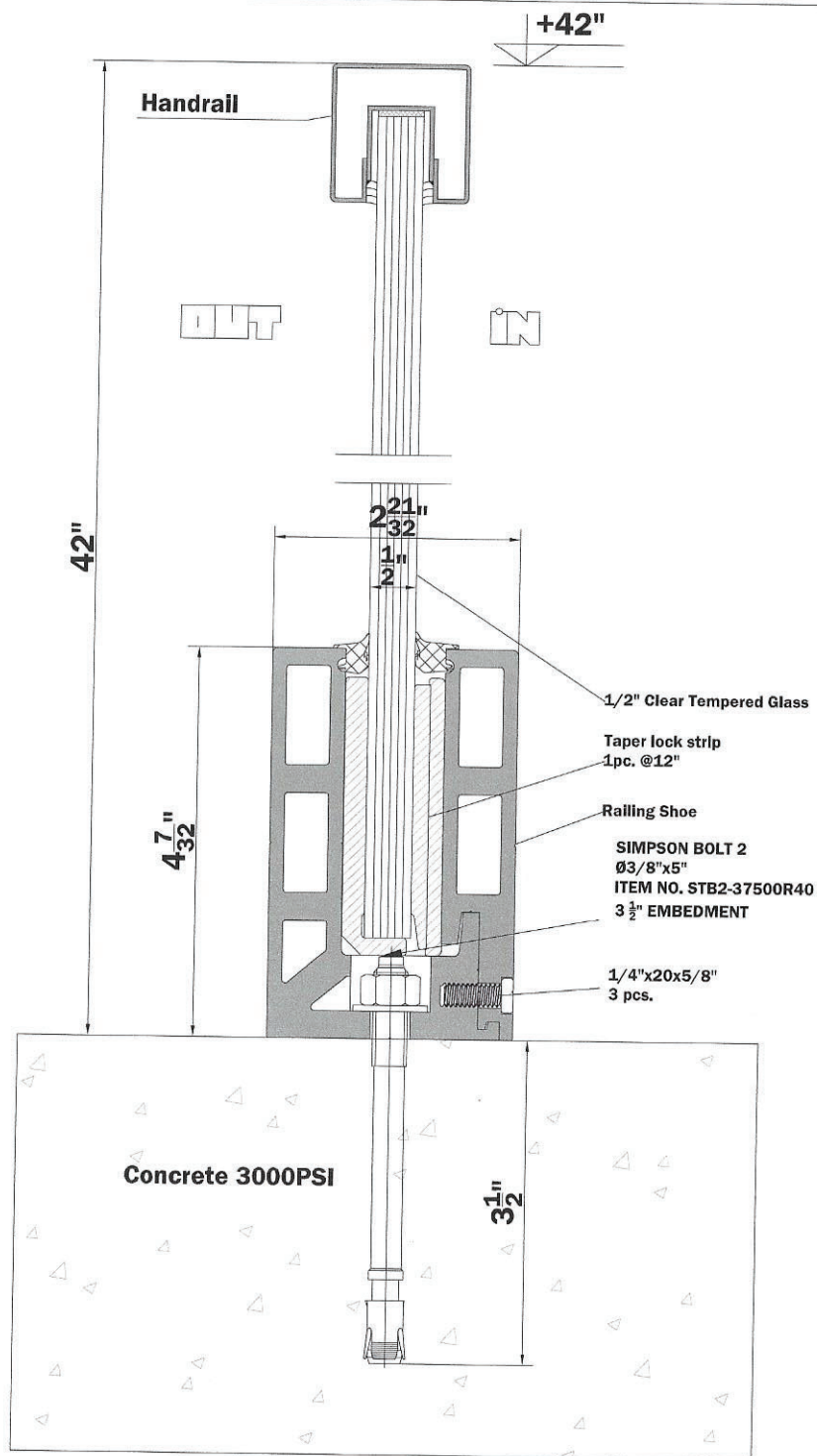
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**WINDLOCH**

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REV.	DESCRIPTION	BY	DATE
PROJECT:		DRAWN BY:	YOAV BEN-SHIMON
LOCATION:		SCALE:	
ARCHITECT:		DATE:	03/23/18
CONSULTANT:		SHEET NO.:	1
SHEET DESCRIPTION: GLASS RAILING - WINDLOCH GRS107			



TYPE A



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1 TYPE A - Connected to Concrete

REV.	DESCRIPTION	BY	DATE
PROJECT:			
LOCATION:			
ARCHITECT:			
CONSULTANT:			
SHEET DESCRIPTION:			
GLASS RAILING - WINDLOCH GRS107			
DRAWN BY:	YOAV BEN-SHIMON		
SCALE:	6"=1' (11x17)		
DATE:	03/23/18		
SHEET NO.:	2		

⑤



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TABLE 1
TEST METHOD "A"

Sheet **7** Of **9**
3/27/2018

TEST METHOD "A"	LOADS (Pounds)	DEFLECTIONS (Inches) After each incremental Loads	DEFLECTIONS (Inches) After the test	COMMENTS
Test A1	30	0		NO FAILURES
	60	0		NO FAILURES
	90	0		NO FAILURES
	120	0		NO FAILURES
	150	0		NO FAILURES
	180	0		NO FAILURES
	200	0	0	NO FAILURES
Test A2	30	0		NO FAILURES
	60	0		NO FAILURES
	90	0		NO FAILURES
	120	0		NO FAILURES
	150	0		NO FAILURES
	180	0		NO FAILURES
	200	0	0	NO FAILURES
Test A3	30	0		NO FAILURES
	60	0		NO FAILURES
	90	0		NO FAILURES
	120	0		NO FAILURES
	150	0.125		NO FAILURES
	180	0.187		NO FAILURES
	200	0.187	0	NO FAILURES
Test A4	30	0		NO FAILURES
	60	0		NO FAILURES
	90	0.125		NO FAILURES
	120	0.312		NO FAILURES
	150	0.437		NO FAILURES
	180	0.55		NO FAILURES
	200	0.625	0	NO FAILURES



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TABLE 2
TEST METHOD "B"

Sht 8 of 9
3/28/2017

TEST METHOD	LOADS	EQUIV. LOADS	DEFLECTIONS (Inches)	DEFLECTIONS (Inches)	COMMENTS
"B"	(Pounds)	(PSF)	After Each	After the Test	
			Incremental Loads	Final Load Released	
B1	117	7.5	0		NO FAILURES
B2	234	15	0		NO FAILURES
B3	351	22.5	0.562		NO FAILURES
B4	468	30	0.75		NO FAILURES
B5	585	37.5	1		NO FAILURES
B6	703	45	1.75		NO FAILURES
B7	820	52.5	2.625		NO FAILURES
B8	936	60	3		NO FAILURES
B9	1053	67.5	3.5		NO FAILURES
B10	1170	75	3.75		NO FAILURES
B11	1248	80	4	0	NO FAILURES

NOTES:

Wind Load Area = $53.5 \times 42 / 144 = 15.6042 \text{ Ft}^2$
Maximum Load in pounds = $15.6042 \times 80 = 1248$

NO FAILURES= NO Glass Breakages, NO permanent deflections of top rail and shoe,
and NO pulling out concrete anchors and removable shoe leg screws

PHOTO # 1

TESTS 1 THRU 4

SH-1059

WOOD JIG

TENSION METER

03/23/2018 10:00

