

***Performance Testing of B.W. Creative Wood Industries Ltd.'s
Clearview Glass Guard Rail System to Section 4.1.10.1 of the
1997 Ontario Building Code***

Final Report No.: 3088853COQ-002B
Original Issue Date: November 30, 2006

IMPORTANT NOTE:

This engineering test report applies ONLY to product manufactured by BW Creative Wood Industries Ltd. This test report does NOT cover RONA "Uberhaus Select" branded product manufactured by others and sold in Ontario, Quebec or Atlantic Canada.



Applicant:
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2 Preface

All services undertaken are subject to the following general policy:

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3 Introduction

Intertek Testing Services NA Ltd. (Intertek) personnel have conducted tests of Structural Performance on the 6 ft. Clearview Glass Rail system for B.W. Creative Wood Products Ltd. The railing system was evaluated for the ability to resist the loads specified in Part 9 of the 2005 National Building Code of Canada, Section 4.1.10.1 *Loads on Guards*. This evaluation was completed in the month of November 2006.

4 Materials and Methods

4.1. SAMPLE SELECTION

The specimen guard railing system components were independently sampled and construction of both guard rail assemblies was witnessed by Intertek representative Kalvir Kooner on October 20, 2006. Two separate systems were assembled; one with Nylon 6 rail mounting brackets and one with angled screw connections.

4.2. SAMPLE DESCRIPTION

The railing system identified as the Clearview Glass Rail system was assembled as follows: Nylon 6 connector brackets (black) are mechanically fastened to cedar handrails using two No. 8 x 1-3/4 in. stainless steel screws. The cedar bottom rail is then attached to the 3-1/4 in. square cedar post using the same connector bracket and screws, then four additional No. 8 x 1-3/4 in. stainless steel screws connect the brackets to posts at four points. Both the top and bottom rails are pre-drilled to accept the tempered glass pickets. The glass pickets are then placed into the bottom rail and the top rail is pressed down onto the assembly and fastened to the posts with the same four No. 8 x 1-3/4 in. stainless steel screws. A 3 in. cedar cap rail is then mechanically connected to the top rail at 300 mm spacing using 3 in. finishing nails. A second guard rail system was also constructed identical to the first one with the exception of four No. 10 x 3 stainless steel screws replacing the Nylon 6 connector bracket and associated screws. Details of both assemblies are provided in the drawings located in Appendix B of this report.

- Post: 3-1/4 in. (82.5 mm) cedar, profile as shown in Appendix B.
- Rails: 42 in. (1067 mm) high, cedar profile as shown in Appendix B.
- Picket Insert: 6 in. (152.4 mm) wide x 8 mm thick tempered glass panels
- Rail Connections: (If applicable) Black Nylon 6 connector as detailed in Appendix B.

Note: Post to sub-structure fastener evaluation is beyond the scope of this report. Steel plates with two 3/8 in. Grade 5 bolts on each post were used to install the specimen for testing.

4.3. TEST PROCEDURES

4.3.1. CODE REQUIREMENTS

OBC 1997: Section 4.1.10.1 Loads on Guards

- 1) The minimum specified horizontal load applied inward or outward at the top of every required guard shall be 0.5 kN/m or a concentrated load of 1.0 kN applied at any point for guards within dwelling units and for exterior guards serving not more than two dwelling units.
- 2) Individual elements within the *guard*, including solid panels and pickets, shall be designed for a concentrated load of 0.5 kN applied at any point in the element or elements so as to produce the most critical effect.
- 3) The minimum specified load applied vertically at the top of every required *guard* shall be 1.5 kN/m
- 4) None of the loads specified above need be considered to act simultaneously.

4.3.2. TEST PROGRAM – 6 ft. Clearview Glass Guard Rail

Tests specimens were loaded at a rate to achieve the specified loads between 10 seconds and 5 minutes. The specified proof loads were held for one minute before the load was released.

4.3.2.1. In-fill Load Test

A load of 1 kN (225 lbf) was applied using a 25.4 mm. square block on the center of the picket system normal to the in-fill in a worst-case scenario. After release of the load, the system was evaluated for failure, any evidence of disengagements of any component and visible cracks in any component.

4.3.2.2. Uniform Load Test

The top rail of the guardrail system was subjected to two separate tests where a maximum equivalent uniform load of 1.0 kN/m (68 plf) was applied horizontally and 3.0 kN/m (205 plf) was applied vertically. The horizontal and vertical loads were applied using quarter point loads calculated to impose an equivalent moment to the uniform loads specified. After release of the load, the system was evaluated for failure, any evidence of disengagements of any component and visible cracks in any component.

4.3.2.3. Concentrated Load Test

The top rail of the guardrail system was subjected to two separate tests where a concentrated load of 2 kN (449 lbf) was applied at the following locations:

- Horizontally at the centre of the guardrail.
- Horizontally at the top rail adjacent to the rail post connection to verify the connection capacity.

5 Test Results

The product test results are shown in Table 1 below.


System Description	System Height (In.)	Maximum Post to Post Center Spacing (In.)	Test	Compliance
6 ft. Clear View Cedar Guard Rail	42	74-3/4	In-fill Load	Complied
			Uniform Load	Complied
			Concentrated Load	Complied

Note: A complete set of Test Data is provided in Appendix A.

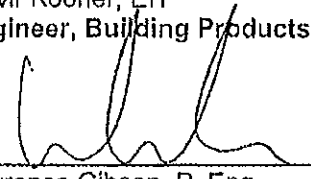
6 Conclusion

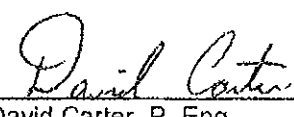
The 6 ft. Clearview Glass Rail system submitted by B.W. Creative Wood Products Ltd., assembled as described in this report, has complied with the loads specified in the 1997 Ontario Building Code, Section 4.1.10.1 *Loads on Guards*.

INTERTEK TESTING SERVICES NA LTD.

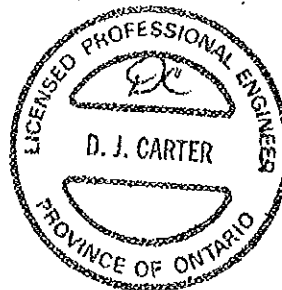
Reported by: 
Ivo Tanner
Senior Technician, Construction Products

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Kalvir Kooner, EIT
Engineer, Building Products

Reviewed by: 
Lawrence Gibson, P. Eng.
General Manager, Building Products

Reviewed by: 
David Carter, P. Eng.
Engineer, Building Products

IT/ahvs



Appendix A: Test Data (2 pages)

Test: OBC Loads on Guards - system without brackets
Date: 6-Nov-06 **Project:** 3088853 **Eng/Tech:** Adam Mantei
Client: B W Creative **Kevin Penner**
Product: Clearview Cedar 3-1/4 post 8mm glass pickets without rail mount brackets
Post Spacing: 6 3/16 ft 1.89 m
Height of Guard: 42.15 in 1071 mm
Opening in Guard: 3.9 in 99 mm
Method: Ontario Building Code 1997
 4.1.10.1. Loads on Guards
Safety Factor: 2
Equipment: Artech 2000 lbs Load cell ID # 2723 due August 2007

Test	Design Load (Inward/Outward) (lbf)	Factored Load	Calculated Moment (lbf-ft)	Equivalent Quarter-Point Load (lbf)	Required Proof Load (lbf)	Pass/Fail
Individual Elements	112	225	-	-	225	Pass
Vertical Uniform Load (per ft)	103	205	987	637	1274	Pass
Horizontal Uniform Load (per ft)	51	103	494	319	637	Pass
Midspan Horizontal Concentrated Load	225	449	-	-	449	Pass
Top of Post Horizontal Concentrated Load	225	449	-	-	449	Pass
Horizontal Means of Egress (per ft)	205	411	1975	1274	2548	Not tested

Test	Design Load (Inward/Outward) (kN)	Factored Load	Calculated Moment (kNm)	Equivalent Quarter-Point Load (kN)	Required Proof Load (kN)	Pass/Fail
Individual Elements	0.5	1	-	-	1	Pass
Vertical Uniform Load (per m)	1.5	3	1.34	0.86	1.73	Pass
Horizontal Uniform Load (per m)	0.75	1.5	0.67	0.43	0.86	Pass
Midspan Horizontal Concentrated Load	1	2	-	-	2	Pass
Top of Post Horizontal Concentrated Load	1	2	-	-	2	Pass
Horizontal Means of Egress (per m)	3	6	2.68	1.7	3.5	Not tested



ETL SEMKO

Test: **OBC Loads on Guards - system with Nylon 6 brackets**
 Date: 6-Nov-06 Project: 3088853 Eng/Tech: Adam Mantei
 Client: B W Creative Kevin Penner
 Product: Clearview Cedar 3-1/4 post 8mm glass pickets without rail mount brackets
 Post Spacing: 6 3/16 ft 1.89 m
 Height of Guard: 42.15 in 1071 mm
 Opening in Guard: 3.9 in 99 mm
 Method: Ontario Building Code 1997
 4.1.10.1. Loads on Guards
 Safety Factor: 2
 Equipment: Artech 2000 lbs Load cell ID # 2723 due August 2007

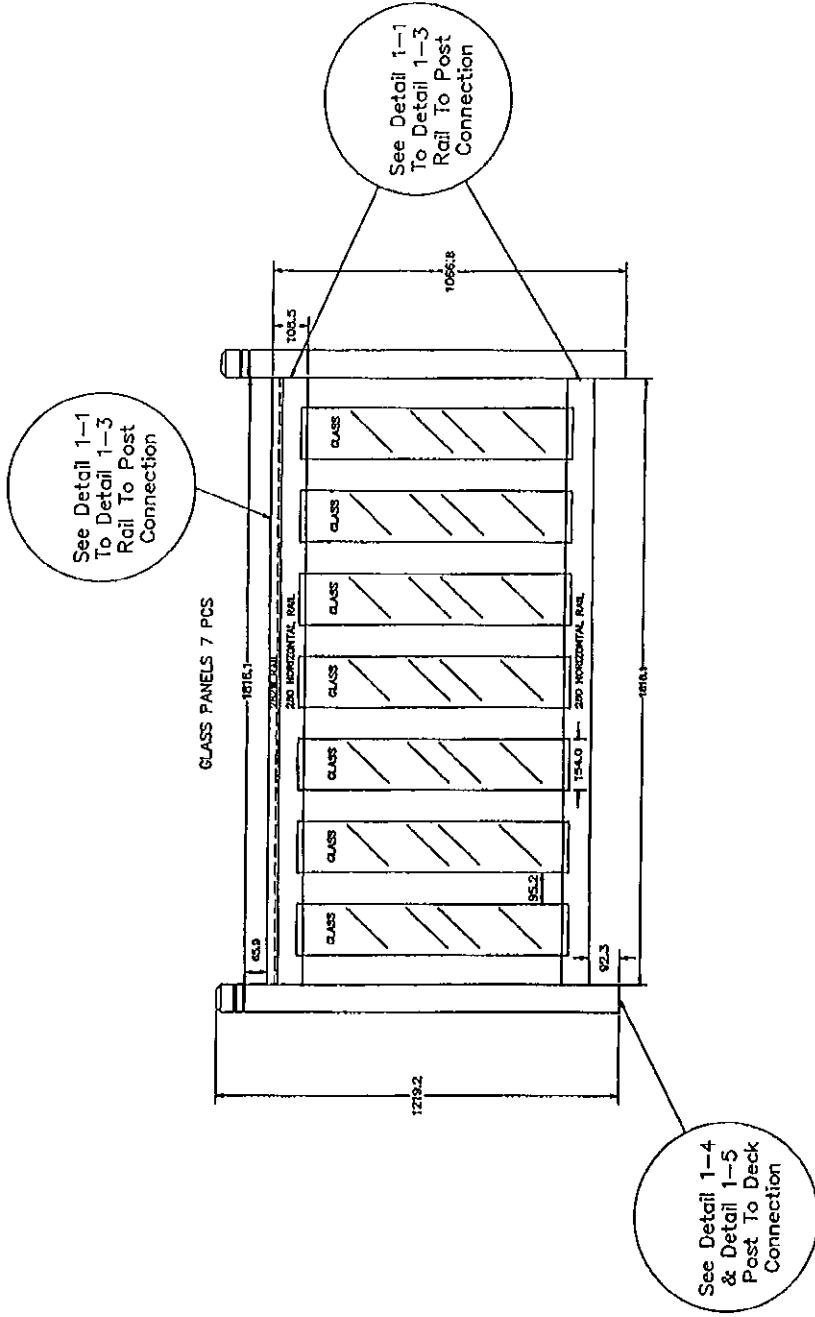
Test	Design Load (Inward/Outward) (lbf)	Factored Load	Calculated Moment (lbf-ft)	Equivalent Quarter-Point Load (lbf)	Required Proof Load (lbf)	Pass/Fail
Individual Elements	112	225	-	-	225	Pass
Vertical Uniform Load (per ft)	103	205	987	637	1274	Pass
Horizontal Uniform Load (per ft)	51	103	494	319	637	Pass
Midspan Horizontal Concentrated Load	225	449	-	-	449	Pass
Top of Post Horizontal Concentrated Load	225	449	-	-	449	Pass
Horizontal Means of Egress (per ft)	205	411	1975	1274	2548	Not tested

Test	Design Load (Inward/Outward) (kN)	Factored Load	Calculated Moment (kNm)	Equivalent Quarter-Point Load (kN)	Required Proof Load (kN)	Pass/Fail
Individual Elements	0.5	1	-	-	1	Pass
Vertical Uniform Load (per m)	1.5	3	1.34	0.86	1.73	Pass
Horizontal Uniform Load (per m)	0.75	1.5	0.67	0.43	0.86	Pass
Midspan Horizontal Concentrated Load	1	2	-	-	2	Pass
Top of Post Horizontal Concentrated Load	1	2	-	-	2	Pass
Horizontal Means of Egress (per m)	3	6	2.68	1.7	3.5	Not tested

Appendix B: Assembly Details (4 pages)



CREATIVE RAILINGS

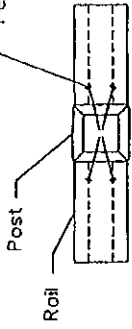


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REVISION: NOVEMBER 6, 2006
APPROVED: _____
CAD FILE: INSTALLATION INSTRUCTIONS

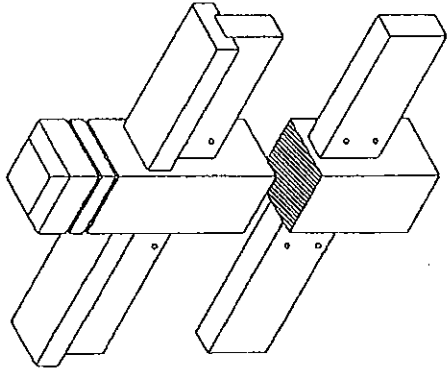
Detail 1-1 Exterior Connection: Rail Fastened To Post



4-#10 x 76mm (3") Stainless Steel Screws
Per Connection

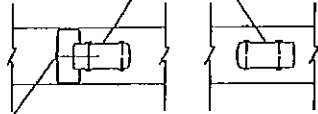


Plan

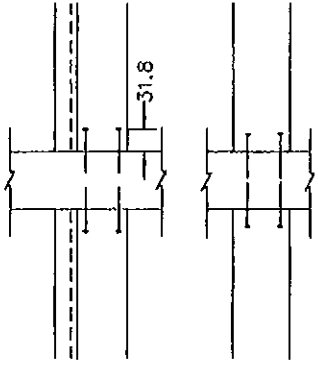


Axonometric

76mm (3")
Galvanized Nails @ 300



Side Elevation



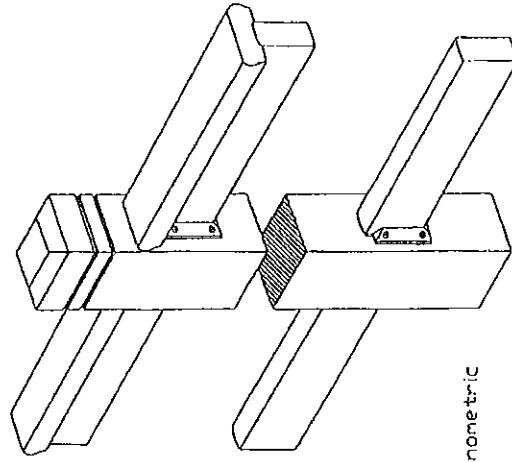
Front Elevation

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CAD FILE: INSTALLATION INSTRUCTIONS

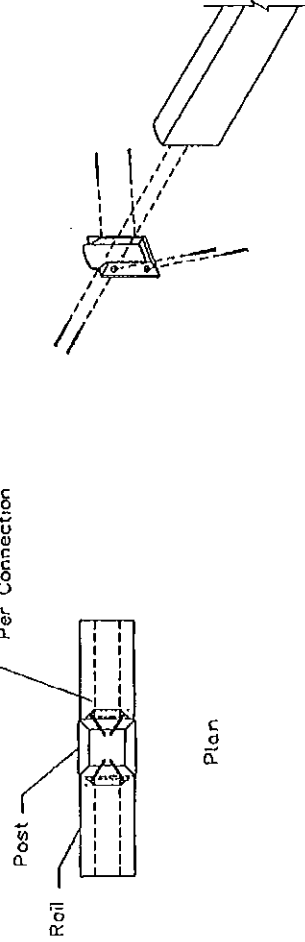
Detail 1-1
Exterior Connection: Top/Bottom Rail Skew Screwed To Post-63mm Screws

- 1) Nails and screws shall not cause splitting of wood elements.
- 2) Fasteners shall be resistant to corrosion.

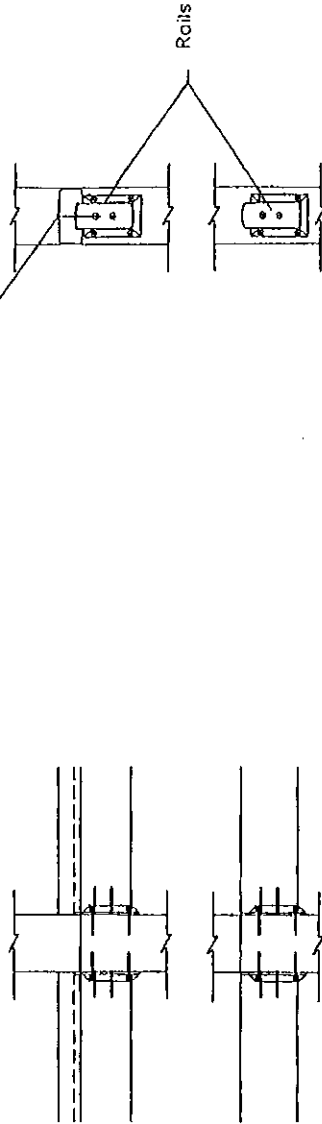
Detail 1-3 Exterior Connection: Rail Fastened To Post With Hanger Bracket



5-#8 x 44mm (1 3/4") Stainless Steel Screws
Per Connection



76mm (3")
Galvanized Nails @ 300



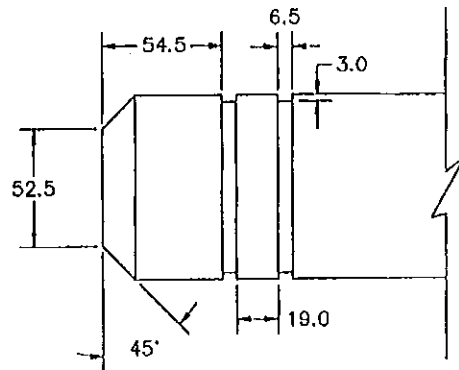
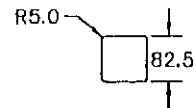
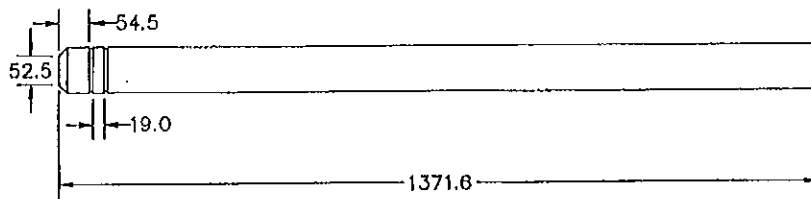
Detail 1-3

Exterior Connection: Top/Bottom Rail Skew Screwed To Post-63mm Screws
Hanger Bracket Screwed To Rail And Post

- 1) Nails and screws shall not cause splitting of wood elements.
- 2) Fasteners shall be resistant to corrosion.

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CAD FILE: INSTALLATION INSTRUCTIONS

Cedar Deck Post
C910654



DIMENSIONS IN MM
REVISION: JANUARY 11, 2006
APPROVED: _____
CAD FILE: 9100-FULLDIM.DWG