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**PERFORMANCE EVALUATION OF THE PLASTIVAL INC.
"TRADITION & HERITAGE GUARDRAIL SYSTEMS"
IN ACCORDANCE WITH THE NBCC 2005 / OBC 2006 GUARD REQUIREMENTS**

Report to:	Plastival Inc. 3055 Anderson Terrebonne, Québec J6Y 1W5
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Report No.:	10-06-M0307 5 Pages, 2 Appendixes
Proposal No.:	10-006-4667 & 10-006-7796
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1.0 INTRODUCTION

At the request of Plastival Inc, Exova was retained to conduct a performance evaluation of two guardrail systems identified as the "Tradition & Heritage Guardrail System" in accordance with the applicable National Building Code of Canada (NBCC) 2005 and the Ontario Building Code (OBC) 2006 requirements for guards as outlined in Proposal Numbers: 10-006-4667 / 10-006-7796.

Upon receipt, the samples were assigned the following Exova Sample Numbers:

<u>Client Sample Description</u>	<u>Exova Sample No.</u>
Style: Tradition Guardrail System	10-06-M0307-A
Type: PVC Guardrail System with Rail Reinforcement	
Baluster Type: ILDC 7/8" x 1-1/2" x 37 5/8" Blank VRAC (Not reinforced)	
Baluster Spacing: 3.875" (Inside spacing between pickets)	
Rail Reinforcement: C-Channel 18GA. GALV. 0.18" x 1.25" x 1.30" x 1.25" x 0.18" (Top & Bottom)	
Length: 68.215" (Between posts)	
Post Type: 4" x 4" sq. x 43.875" (height), with 28" (high) universal post bracket	
Post Height: 42" Post Height from Decking	
Post Anchors Used: Ø1/4", 3" (long), Hex. Lag Screws (x 8) – See Appendix A	
Support: Universal centre support in mid span of bottom rail (PVC)	
Setting Method: Wood Deck (Option B) – See Appendix A	
Details Location: Appendix A	

<u>Client Sample Description</u>	<u>Exova Sample No.</u>
Style: Heritage Guardrail System	10-06-M0307-B
Type: PVC Guardrail System with Rail Reinforcement	
Baluster Type: Colonial Picket 32 1/2"	
Baluster Spacing: 3.438" (Inside spacing between pickets)	
Rail Reinforcement: C-Channel 18GA. GALV. 0.18" x 1.25" x 1.30" x 1.25" x 0.18" (Top Rail)	
Length: 68.215" (Between posts)	
Post Type: 4" x 4" sq. x 43.875" (height), with 28" (high) universal post bracket	
Post Height: 42" Post Height from Decking	
Post Anchors Used: Ø1/4", 3" (long), Hex. Lag Screws (x 8) – See Appendix A	
Support: Universal centre support in mid span of bottom rail (PVC)	
Setting Method: Wood Deck (Option B) – See Appendix B	
Details Location: Appendix B	

2.0 PROCEDURE

The Building Performance Centre at Exova evaluated the above guardrail systems in accordance with the loads and locations (including 1.5 x factored load requirements) as specified in NBCC 2005 / OBC 2006 codes:

- National Building Code of Canada Section 4.1.5.15.1 (c) , 4.1.5.15.2, 4.1.5.15.4
- Ontario Building Code Section 4.1.5.15.1(c), 4.1.5.15.2, 4.1.10.1.4

Note: All testing was performed in triplicate.

3.0 RESULTS

Table 1 – Summarized Guard Testing Results Exova Sample Number: 10-06-M0307-A				
Loading Description	Specified Load	Minimum Design Load Required	1.5 x Factored Load Required	Test Result (Pass / Fail)
Ontario Building Code (2006) Section 4.1.5.15.1(c) / NBCC 4.1.5.15.1(c) – 0.75kN/m or 1.0kN Applied at Any Point				
Uniformly distributed load applied in the horizontal direction	0.75 kN/m (51 lbs/ft)	1.2 kN/m (274 lbs/ft)	1.8 kN/m (411 lbs/ft)	Pass
Concentrated load applied at the midpoint of the rail in a horizontal direction	1.0 kN (225 lbf)	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at end of the rail in horizontal direction	1.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Uniformly distributed load applied in the vertical direction	0.75 kN/m (51 lbs/ft)	1.2 kN/m (274 lbs/ft)	1.8 kN/m (411 lbs/ft)	Pass
Concentrated load applied at the midpoint of the rail in vertical down direction	1.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at the end of the rail in vertical down direction	1.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at the midpoint of the rail in vertical up direction	1.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at the end of the rail in vertical up direction	1.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Ontario Building Code (2006) Section 4.1.5.15.2 / NBCC 4.1.5.15.2 – 0.5 kN/100 mm² Applied to Elements Within the Guard				
Concentrated load applied to individual spindles (balusters)	0.5 kN (113 lbf)	0.5 kN (113 lbf)	0.75 kN (170lbf)	Pass
Ontario Building Code (2006) Section 4.1.10.1.4 / NBCC 4.1.5.15.4 – 1.5 kN/m Applied Vertically at the Top of Every Guard				
Uniformly distributed load applied in vertical down direction	1.5 kN/m (103 lbf/ft)	2.44 kN/m (548 lbf/ft)	3.66 kN/m (822 lbf/ft)	Pass
Uniformly distributed load applied in vertical up direction	1.5 kN/m (103 lbf/ft)	2.44 kN/m (548 lbf/ft)	3.66 kN/m (822 lbf/ft)	Pass

Note: A "pass" is given if there are no cracks, breaks or permanent deformation to the element tested after the factored loads were released. Each load was maintained for 1 minute.

Table 2 – Summarized Guard Testing Results Exova Sample Number: 10-06-M0307-B				
Loading Description	Specified Load	Minimum Design Load Required	1.5 x Factored Load Required	Test Result (Pass / Fail)
Ontario Building Code (2006) Section 4.1.5.15.1(c) / NBCC 4.1.5.15.1(c)– 0.75kN/m or 1.0kN Applied at Any Point				
Uniformly distributed load applied in the horizontal direction	0.75 kN/m (51 lbs/ft)	1.37 kN/m (308 lbs/ft)	2.06 kN/m (462 lbs/ft)	Pass
Concentrated load applied at the midpoint of the rail in a horizontal direction	2.0 kN (225 lbf)	2.0 kN (225 lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at end of the rail in horizontal direction	2.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Uniformly distributed load applied in the vertical direction	0.75 kN/m (51 lbs/ft)	1.37 kN/m (308 lbs/ft)	2.06 kN/m (462 lbs/ft)	Pass
Concentrated load applied at the midpoint of the rail in vertical down direction	2.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at the end of the rail in vertical down direction	1.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at the midpoint of the rail in vertical up direction	2.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Concentrated load applied at the end of the rail in vertical up direction	2.0 kN (225lbf)	1.0 kN (225lbf)	1.5 kN (337.5 lbf)	Pass
Ontario Building Code (2006) Section 4.1.5.15.2 / NBCC 4.1.5.15.2 – 0.5 kN/100 mm² Applied to Elements Within the Guard				
Concentrated load applied to individual spindles (balusters)	0.5 kN (113 lbf)	0.5 kN (113 lbf)	0.75 kN (170lbf)	Pass
Ontario Building Code (2006) Section 4.1.10.1.4 / NBCC 4.1.5.15.4 – 1.5 kN/m Applied Vertically at the Top of Every Guard				
Uniformly distributed load applied in vertical down direction	1.5 kN/m (103 lbf/ft)	2.74 kN/m (617 lbf/ft)	4.12 kN/m (925 lbf/ft)	Pass
Uniformly distributed load applied in vertical up direction	1.5 kN/m (103 lbf/ft)	2.74 kN/m (617 lbf/ft)	4.12 kN/m (925 lbf/ft)	Pass

Note: A "pass" is given if there are no cracks, breaks or permanent deformation to the element tested after the factored loads were released. Each load was maintained for 1 minute.

4.0 MODIFICATIONS

The following modifications were made to Exova Sample Numbers: 10-06-M0307-A & B to achieve the results stated in this report.

- Four (4) "No.10-32 x 1" screws, nuts and washers were used to fasten each upper horizontal rail mounting bracket to the post. This fastening method replaced the original self tapping screws (No. 10 x 3/4") used on the upper horizontal rail mounting bracket. - See Appendix A & B, figures A1, A2 & B1, B2 for details.

5.0 CONCLUSIONS

Based on the results of the testing summarised in Tables 1 & 2, the Plastival Inc., "Tradition & Heritage Guardrail Systems" met the following requirements:

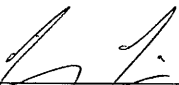
Exova Sample No. 10-06-M0307-A

National Building Code of Canada Section 4.1.5.15.1 (c) , 4.1.5.15.2, 4.1.5.15.4
Ontario Building Code Section 4.1.5.15.1(c), 4.1.5.15.2, 4.1.10.1.4


Exova Sample No. 10-06-M0307-B

National Building Code of Canada Section 4.1.5.15.1 (c) , 4.1.5.15.2, 4.1.5.15.4
Ontario Building Code Section 4.1.5.15.1(c), 4.1.5.15.2, 4.1.10.1.4


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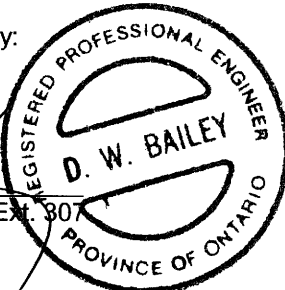

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