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EVALUATION REPORT

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Evaluation Report C35420.02.14-2-R1
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1. SCOPE:

Evaluation of the "Oxford Guard Rail System" for conformance with the National Building Code of Canada (NBC) 2010 and the Ontario Building Code (OBC) 2012 loading requirements for guards within dwelling units serving no more than two dwelling units.

This Evaluation Report consists of pages 1 through 3.

2. STANDARDS:

<u>Standard</u>	<u>Year</u>	<u>Property</u>
NBC, Section 9.8.8.2	2010	Loading requirements
OBC, Section 9.8.8.2	2012	Loading requirements
ICC-ES AC174	2012	Loading procedure
ICC-ES AC273	2008	Loading requirements
ASTM D1761	2000	Fastener loading
ASTM D7032	2010	Performance ratings

3. REFERENCES:

<u>Entity</u>	<u>Examination</u>	<u>Reference</u>	<u>Date</u>
Architectural Testing, Inc.	Concentrated Load	A6270.05.119-19	04/04/2012
Architectural Testing, Inc.	Uniform Load	D2183.01-119-19	12/19/2013

4. PRODUCT DESCRIPTION:

4.1 The Oxford Guard Rail System is comprised of PVC rails, balusters and post-sleeves produced by extrusion process and by a blow molding process (PVC spindles). Rails are reinforced with aluminum and attached to wood or metal support posts using external aluminum brackets or internal rail metal connector plates.

TABLE 1: RAILING DESCRIPTION	
Style:	Oxford Guard Rail System
Type:	Exterior use guard rail system for one and two family dwellings
Materials:	Extruded thermoplastic (PVC) with aluminum reinforcement
Rail Type:	Top: 3-1/2" high x 3" wide PVC T-rail Bottom: 3-1/2" high x 1-3/4" wide PVC rectangular rail
Rail Reinforcement:	Top: U-rail; 6005-T5 aluminum alloy; 3.1" high x 1.5" wide x 0.14" thick Bottom: U-rail; 6005-T5 aluminum alloy; 3.1" high x 1.5" wide x 0.06" thick
Rail Connection:	External aluminum brackets or internal connector plates
Baluster Type:	1-1/4" square PVC picket or 1-1/4" square PVC spindle
Support:	Attached to full height posts or walls
Post Options:	Nominal 4x4" PT Southern Yellow Pine; E-Z Set Post Mounts or LMT Blu-Mounts

5. ANALYSIS:

- 5.1 Trinity|ERD evaluated the above-noted guardrail system for conformance with the loading requirements and load application locations as specified in the NBC 2010 / OBC 2012 codes.
- 5.2 The test loads were the code live loads (LL) x live load factor listed in Section 4.1.3.2.5 ($\Phi = 1.5$) x Factor of Safety (FOS = 1.5).

TABLE 2A: RESULTS, UNIFORM LOAD DISTRIBUTION							
Loading	LL		$\Phi \times LL$		Test Load		Results
	kN/m	plf	kN/m	plf	kN/m	plf	
Horizontal	0.5	34	0.75	51	1.13	77	Pass
Vertical (down)	1.5	103	2.25	154	3.38	231	Pass

TABLE 2B: RESULTS, CONCENTRATED LOAD							
Loading	LL		$\Phi \times LL$		Test Load		Results
	kN	lbf	kN	lbf	kN	lbf	
Midpoint / horizontal	1.0	225	1.50	337	2.25	506	Pass
End / horizontal	1.0	225	1.50	227	2.25	506	Pass
Spindles (balusters)	0.5	112	0.75	169	1.13	253	Pass

6. LIMITATIONS:

- 6.1 Analysis is limited to exterior use guard rail system for one and two family dwellings.
- 6.2 Anchorage of support posts to the supporting structure is not included in this Evaluation Report and would need to be evaluated separately.
- 6.3 This evaluation is limited to the following:
- 6.3.1 Level / In-Line Assembly (external brackets at both ends): Maximum rail-length between adequate supports of 96-inch with maximum overall rail height (from top of top rail to bottom of bottom rail) of 40-inch.
- 6.3.2 Level / In-Line Assembly (external brackets at one end and internal connector plates at the other): Maximum rail-length between adequate supports of 94-1/2-inch with maximum overall rail height (from top of top rail to bottom of bottom rail) of 40-inch.
- 6.3.3 Stair Assembly (external brackets at both ends): Maximum rail-length between adequate supports of 94-inch with maximum overall rail height (from top of top rail to bottom of bottom rail) of 39-1/2-inch.
- 6.3.4 Stair Assembly (external brackets at one end and internal connector plates at the other): Maximum rail-length between adequate supports of 92-1/2-inch with maximum overall rail height (from top of top rail to bottom of bottom rail) of 39-1/2-inch.

7. INSTALLATION:

7.1 In accordance with CertainTeed published installation instructions subject to the following fastening schedule limitations:

TABLE 3: MINIMUM FASTENING SCHEDULE		
Post Type	Connection	Fastening
4x4 PT SYP	Rail Bracket to Post	Four (4) #8-18 x 2" (0.120" minor diameter) pan head, self-drilling screws
	Rail Bracket to Rail	Two (2) #8-18 x 3/4" (0.120" minor diameter) pan head, self-drilling screws (9/64" diameter pre-drill)
E-Z Set Post Mount (External Brackets)	Top and Bottom Internal PVC Blocks to Post Mount	One (1) 1/4" x 2-3/4" steel hex bolt with nut
	External Rail Mounting Bracket to Internal PVC Block	Four (4) #8-18 x 2" (0.120" minor diameter) pan head, self-drilling screws (9/64" diameter pre-drill)
	Rail to External Rail Mounting Bracket	Two (2) #8-18 x 3/4" (0.120" minor diameter) pan head, self-drilling screws (9/64" diameter pre-drill)
E-Z Set Post Mount (Internal Rail Metal Connector Plate)	Internal Rail Metal Connector Plate to Post	Insert to rest atop top of rail (no fastening to post)
	Internal Rail Metal Connector Plate to Rail	One (1) 1/4" x 7/8" hex washer head, thread cutting machine screw (13/64" diameter pre-drill)
LMT Blu-Mount Post (External Brackets)	PVC Guide to LMT Blu-Mount	One (1) #10-16 x 3/4-inch (0.140 minor diameter) pan head, self-starting screw (1/8" diameter pre-drill)
	External Rail Mounting Bracket to Internal PVC Guide	Four (4) #8-18 x 2" (0.120" minor diameter) pan head, self-drilling screws (9/64" diameter pre-drill)
	Rail to External Rail Mounting Bracket	Two (2) #8-18 x 3/4" (0.120" minor diameter) pan head, self-drilling screws (9/64" diameter pre-drill)

8. COMPLIANCE STATEMENT:

The **Oxford Guard Rail System**, as produced by CertainTeed Corporation, has demonstrated compliance with the sections of the National Building Code and Ontario Building Code noted in Section 2 through testing in accordance with the referenced Standards. Compliance is subject to the Limitations and Installation sections noted herein.

9. CERTIFICATION OF INDEPENDENCE:

Exterior Research & Design, LLC. d/b/a Trinity | ERD does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products it evaluates.

Exterior Research & Design, LLC. d/b/a Trinity | ERD is not owned, operated or controlled by any company manufacturing or distributing products it evaluates.

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