



# Code Compliance Research Report CCRR-0187

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**DIVISION: 06 00 00 – WOOD, PLASTICS AND COMPOSITES**

**Section: 06 63 00 – Plastic Railings**

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**REPORT SUBJECT:**  
*Oxford Vinyl Railing System*

## 1.0 SCOPE OF EVALUATION

1.1. This research report addresses compliance with the following Codes:

- 2015 International Building Code® (IBC)
- 2015 International Residential Code® (IRC)
- 2012 International Building Code® (IBC)
- 2012 International Residential Code® (IRC)
- 2014 Florida Building Code (see Section 9)  
*Excluding High Velocity Hurricane Zone (HVHZ)*

Sections of the IBC and IRC referenced in this report are applicable to the FBC and Florida Residential Code respectively.

1.2. The *Oxford Vinyl Railing System* has been evaluated for the following properties (see Table 1):

- Structural Performance
- Durability
- Surface Burning

1.3. *Oxford Vinyl Railing* has been evaluated for the following uses (see Table 1):

- The *Oxford Vinyl Railing System* are guardrails (guards) under the definitions of the referenced codes and are intended for use on elevated walking areas in buildings and walkways, including stairs and ramps, as required by the referenced codes.
- Guard systems are provided as level guards for level walking areas such as decks, balconies and

porches, and sloped guards for open sides of stairways.

- Guardrail systems recognized in this report may be used in One- and Two-Family Dwellings regulated by the IRC and all construction types regulated by the IBC in accordance with IBC Section 1406.3, Exception 2. Guardrails less than 42 inches high are limited to use in One- and Two-Family Dwellings (IRC). See Table 1 for additional restrictions based upon Use and Occupancy Classification.

## 2.0 STATEMENT OF COMPLIANCE

2.1. The *Oxford Vinyl Railing System* complies with the Codes listed in Section 1.1, for the properties stated in Section 1.2 and uses stated in Section 1.3, when installed as described in this report, including the Conditions of Use stated in section 5.

## 3.0 DESCRIPTION

3.1. Level guards are provided in lengths up to 115-1/2 inch between supports and overall heights up to 42 inches. See Table 2 and Table 3.

3.2. Stair guards are provided in lengths up to 114-1/2 inch between supports projected along the stair slope and 42 inch high projected vertically. See Table 2 and Table 3.

3.3. Oxford Vinyl Railing Systems are an assemblage of co-extruded and molded components utilizing almond, clay and white Poly Vinyl Chloride (PVC) material with aluminum reinforcements and metal mounting brackets. Systems consist of the following components:

3.3.1. Top rails are T-Rail profiles 3 inch wide at the top, 1-3/4 inch wide at the bottom and approximately 3.5 inch tall.

3.3.2. Bottom rails in all systems are a 1-3/4 inch wide by 3.5 inch tall rectangular profile.

3.3.3. Balusters supplied in the three styles identified below. Rails are routed to the shape of the baluster

profile to receive balusters. See Table 2 and Table 3 for uses.

**3.3.3.1.** Spindle – thermoformed PVC, 1-1/4 inch square cross-section and thermoformed to a turned spindle through the middle of its length with a nominal wall thickness of 0.105 inch.

**3.3.3.2.** Picket – co-extruded PVC, 1-1/4 inch square along the entire length with a nominal wall thickness of 0.105 inch.

**3.3.3.3.** Glass balustrades – 4-1/8 inch wide by 38-1/4 inch long by 0.32 inch thick tempered glass with two angled corners.

**3.3.4.** An extruded 6005-T5 aluminum insert provides reinforcement in the top and bottom rails. The “Light U” aluminum insert is used in the bottom rail for rail lengths as specified in Table 2 and Table 3. The “Heavy U” aluminum insert is used in top rails for all rail lengths and bottom rails for rail lengths as specified in Table 2 and Table 3. See Figure 5 for aluminum insert profiles.

**3.3.5.** Top and bottom rails are connected to posts using external or internal metal brackets, as defined in Table 1 – Fastening Schedule.

**3.3.6.** The Oxford Vinyl Railing Systems are attached to conventional wood supports, the *EZ-Set* post mount, or *The Mount* (also known as the *LMT Blu-Mount*). A 4 inch square PVC post sleeve is used as non-structural cover for conventional 4x4 wood posts which are outside the scope of this report or, as a structural support post when installed over the *EZ-Set* post mount or *The Mount*. See Figure 7 through Figure 9.

**3.3.7.** The *EZ-Set* post mount may be utilized for installation to concrete or structural framing of a wood deck. *EZ-Set* post mount nylon inserts serve as spacer blocks located at the top and bottom rail attachments. Alternatively, the *EZ-Set* metal bracket and railing lock plate may serve as a spacer. See Installation outlined in Section 5.0 and Conditions of Use outlined in Section 6.0.

**3.3.7.1.** The *EZ-Set* post mount for concrete installation consists of a 1.68 inch diameter galvanized steel pipe permanently welded to a 3.5 inch square by 5/16 inch thick galvanized steel base plate. See Table 1 – Fastening Schedule

**3.3.7.2.** The *EZ-Set* post mount for installation in structural framing of a wood deck consists of a 1.68 inch

galvanized steel pipe permanently welded to a 4.5 inch high by 3.5 inch by 3.5 inch (1/4 inch thick) “L” shaped galvanized steel plate

**3.3.8.** *The Mount* is utilized for installation to concrete. PVC guide blocks serve as spacer blocks located at the top and bottom rail attachments (see Figure ). See Installation outlined in Section 5.0 and Conditions of Use outlined in Section 6.0.

**3.3.8.1.** *The Mount* installation for concrete installation consists of a 2 inch square 10 gage steel tube post permanently welded to a 3.5 inch square by 5/8 inch thick galvanized steel base plate. See Table 1 – Fastening Schedule.

## 4.0 PERFORMANCE CHARACTERISTICS

**4.1.** The *Oxford Vinyl Railing System* described in this report has demonstrated the capacity to resist the design loads specified in Chapter 16 of the IBC and FBC, as well as Section R301 of the IRC when tested in accordance with ICC-ES AC174 for uses limited to One- and Two-Family Dwellings.

**4.2.** Structural performance has been demonstrated for a temperature range from -20°F to 125°F.

**4.3.** Materials used are deemed equivalent to preservative treated or naturally durable wood for resistance to weathering effects, decay, and attack from termites.

**4.4.** Materials used in the Oxford guardrail system have a flame spread index not exceeding 200 when tested in accordance with ASTM E 84, as required by the reference criteria, AC174.

## 5.0 INSTALLATION

The *Oxford Vinyl Railing System* must be installed in accordance with the manufacturer’s published installation instructions, the applicable Code and this Research Report. A copy of the manufacturer’s instructions must be available on the jobsite during installation.

**5.1.** Railing assemblies consist of top and bottom rails with pre-routed holes to receive balusters. Aluminum railing reinforcements are inserted in the rails during assembly as specified for the type and length of railing (see Tables 3 & 4). Aluminum insert lengths must be the same length as the PVC railings to assure bracket screws penetrate the aluminum inserts.

**5.2.** Railings are secured to sleeved 4x4 wood posts, the *EZ-Set* post mount, or *The Mount* with metal brackets and stainless steel screws. The wood in the supporting structure shall have a specific gravity of 0.50 or greater (Southern Yellow Pine or better) and a minimum thickness to allow full penetration of the bracket mounting screws. Rail attachment shall be in accordance with Table 1.

**5.2.1.** The *EZ-Set* post mount uses two types of rail attachments.

**5.2.1.1.** Two nylon blocks are held in place by a 1/4-20 x 2.75 inch hex bolt and nut through predrilled holes in both the blocks and the steel center posts. There are two block assemblies per each *EZ-Set* post mount. Once the blocks are installed, the PVC sleeve is assembled over the *EZ-Set* post mount.

**5.2.1.2.** Two *EZ-Set* aluminum brackets are clamped to the center post with two 1/4 inch x 2-3/4 inch steel hex bolts and nuts. There are two of these assemblies per each *EZ-Set* post mount. Once the bracket assemblies are installed, a PVC sleeve (routed to fit the top and bottom rails) is assembled over the *EZ-Set* post mount. The stainless steel railing lock plate is inserted over the steel center post, for attachment to the top rail.

**5.2.2.** *The Mount* utilizes a PVC guide, held in place by a #10-16 x 3/4 inch self-starting, pan-head sheet metal screw. There are two PVC guides per each mount. Once the guides are installed, the PVC sleeve is assembled over *The Mount*.

**5.3.** The *EZ-Set* post mounts shown in Figures 7 and 8 are anchored to suitable structural support framing within a wood deck system or anchored to concrete with approved anchors.

**5.3.1.** The wood deck installation for the *EZ-Set* post mount utilizes four 1/2 inch diameter galvanized carriage bolts to attach the structural wood framing and the "L" shaped anchor plate.

**5.3.2.** The *EZ-Set* post mount concrete surface mount installation utilizes four 1/2 inch anchor bolts. The type and length of the anchor bolts is dependent upon the material and condition of the supporting structure and is not within the scope of this report. See Section 6.0 - Conditions of Use for additional requirements.

**5.4.** *The Mount* shown in Figure 9 is anchored to concrete with approved anchors. Concrete surface mount installation utilizes four 3/8 inch anchor bolts.

The type and length of the anchor bolts is dependent upon the material and condition of the supporting structure and is not within the scope of this report. See Section 6.0 - Conditions of Use for additional requirements.

## 6.0 CONDITIONS OF USE

The Guard assemblies identified in this report are deemed to comply with the intent of the provisions of the building codes subject to the following conditions:

**6.1.** Installation must comply with this Research Report, the manufacturer's published installation instructions and the applicable Code. In the event of a conflict, this report governs.

**6.2.** See Section 1.3 for construction type(s) and use classifications(s).

**6.3.** Conventional wood guardrail supports including 4x4 posts, and framing are not within the scope of this report and are subject to evaluation and approval by the building official. Supports must satisfy the design load requirements specified in Chapter 16 of the IBC and FBC. Supports and framing must provide suitable material for anchorage of the rail brackets and post mount, respectively. Where required by the building official, engineering calculations and details shall be provided.

**6.4.** Concrete anchors and anchoring systems for use with the *EZ-Set* post mount and *The Mount* are not within the scope of this report and are subject to evaluation and approval by the building official. Anchors must satisfy the design load requirements specified in Chapter 16 of the building code and must meet the following minimum requirements:

**6.4.1.** A minimum of four anchor bolts must be used and located in the four pre-drilled holes in the post base plate.

**6.4.2.** The anchors must be stainless steel, galvanized steel or other approved material compatible with the steel post mount system.

**6.4.3.** The anchor bolts must have a minimum diameter of 1/2 inch, for the *EZ-Set* post mount, or 3/8 inch, for *The Mount*, and utilize flat washers. The type and length of the anchor bolts is dependent upon the material and condition of the supporting structure and is not within the scope of this report.

**6.4.4.** When the supporting structure is a wood framed deck, installation must include anchorage to suitable structural framing. Decking is not considered structural framing, and anchorage to decking alone is not an approved installation method.

**6.4.5.** Where required by the building official, engineering calculations and details shall be provided. The calculations shall verify that the anchorage and supporting structure complies with the building code for the type and condition of the supporting construction.

**6.5.** Any component or configuration not identified in this report has not been evaluated for performance and/or compliance to the referenced codes. Identification of such components with the CCRR program mark or number is prohibited.

**6.6.** Only those types of fasteners and fastening methods described in this report have been evaluated for the installation of the Oxford Railing System; other methods of attachment are outside the scope of this report.

**6.7.** Compatibility of fasteners and other installation hardware with the supporting construction including treated wood is not within the scope of this report.

**6.8.** The glass balustrade of guards is considered a hazardous location as defined by Sections 2406.4 of the IBC and 2406.3 of the FBC. Glass must be identified by permanent etching as required by Sections 2406.3 of the IBC and 2406.2 of the FBC. Each section of glass must bear the manufacturer's name or mark and the acceptable test standard. (Class A of ANSI Z97.1-2009 or Category II of 16 CFR 1201).

**6.9.** Guards utilizing glass balustrade are not approved for use in wind-borne debris regions as defined by the IBC in accordance with Section 2407.1.4.

**6.10.** The *Oxford Vinyl Railing System* is manufactured in Buffalo, NY in accordance with the manufacturer's approved quality control system with inspections by Intertek-ATI (IAS AA-676).

## 7.0 SUPPORTING EVIDENCE

**7.1.** Manufacturer's drawings and installation instructions.

**7.2.** Reports of testing demonstrating compliance with ICC-ES AC174, Acceptance Criteria for Deck Board

Span Ratings and Guardrail Systems (Guards and Handrails), revised December 2014 with additional testing including increased test loads to address IBC and FBC Section 2407.1.1 for assemblies that utilize glass balusters.

**7.3.** Reports of testing and engineering analysis demonstrating compliance with the performance requirements of ASTM D 7032-08, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails).

**7.4.** Documentation of an Intertek approved quality control system for the manufacturing of products recognized in this report.

## 8.0 IDENTIFICATION

**8.1.** The *Oxford Vinyl Railing System* is produced in accordance with this report shall be identified with labeling on the individual components or the packaging that includes the following information:

- The following statement: "See CCRR-0187 at [www.ati-es.com](http://www.ati-es.com) for uses and performance levels."
- The phrase: "For Use in One- and Two-Family Dwellings Only" for the applicable guardrail systems. See Table 4.
- The Intertek Code Compliance Research Report mark and number (CCRR-0187).



## 9.0 OTHER CODES

### 9.1. Scope of Evaluation

The *Oxford Vinyl Railing System* was evaluated for compliance with the 2014 Florida Building Code.

### 9.2. Conclusion

The *Oxford Vinyl Railing System* described in Sections 2.0 through 7.0 of this Research Report, comply with the 2014 Florida Building Code:

- Use of the *Oxford Vinyl Railing System* for compliance with the High-Velocity Hurricane Zone provisions of the 2014 Florida Building Code has not been evaluated, and is outside the scope of this Research Report.

#### 10.0 CODE COMPLIANCE RESEARCH REPORT USE

**10.1.** Approval of building products and/or materials can only be granted by a building official having legal

authority in the specific jurisdiction where approval is sought.

**10.2.** Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

**10.3.** Reference to the Intertek website address: [whdirectory.intertek.com](http://whdirectory.intertek.com) is recommended to ascertain the current version and status of this report.

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**TABLE 1 – FASTENING SCHEDULE**

Support Post	Rail Connection Condition	Connection	Fastener	Qty.
<i>EZ-Set Post Mount System</i>	Internal rail metal connector plate and routed post sleeve (Figure & Figure)	Internal Rail Metal Connector Plate to Post (Top Rail Only)	No fastener is used. The bracket, which fits around the post, is placed inside the routed PVC post sleeve and rests on top of the top rail.	None
		Internal Stainless Steel Rail Connector Plate to Top Rail	1/4 inch-20 x 7/8 inch hex washer head thread cutting machine screw <sup>(1)</sup>	1
		Top and Bottom Internal Aluminum Bracket to Post Mount	1/4 inch-20 x 2-3/4 inch steel hex bolt with nut	2
	Internal nylon blocks and external aluminum brackets (Figure & Figure)	Rail Mounting Bracket to Internal Nylon Block	#8-18 x 2 inch stainless steel, self-starting, pan-head sheet metal screw	4
		Rail Mounting Bracket to Rail	#8-9 x 3/4 inch stainless steel, self-starting, pan-head sheet metal screw	2
		Top and Bottom Internal Nylon Blocks to Post Mount	1/4 inch x 2-3/4 inch steel hex bolt with nut	1
<i>The Mount</i>	Internal 3.5 inch square molded PVC guide and external aluminum brackets (Figure )	Rail Bracket to Post	#8-18 x 2 inch stainless steel, self-starting, pan-head sheet metal screw	4
		Rail Bracket to Rail	#8-9 x 3/4 inch stainless steel, self-starting, pan-head sheet metal screw	2
		Top and Bottom PVC guide to Post Mount	#10-16 x 3/4 inch stainless steel, self-starting, pan-head sheet metal screw	1
Conventional 4x4 Wood Post	External aluminum brackets (Figure )	Rail Bracket to Post	#8-18 x 2 inch stainless steel, self-starting, pan-head sheet metal screw	4
		Rail Bracket to Rail	#8-9 x 3/4 inch stainless steel, self-starting, pan-head sheet metal screw	2

<sup>(1)</sup> Pre-drill a 3/16 inch hole through the rail and the aluminum insert in the top rail.

**TABLE 2 – OXFORD GUARDRAIL SYSTEMS FOR IRC AND FBC-RESIDENTIAL OCCUPANCIES (1)**

Type	Maximum Guardrail Dimensions	Support Post	Baluster	Aluminum Reinforcement	
				Bottom Rail	Top Rail
Level <sup>(2)</sup>	115-1/4 inch x 42 inch	Conventional 4x4 wood post, <i>The Mount</i> <sup>(6)</sup> , or <i>EZ-Set Post Mount</i>	Spindle or Picket	6005-T5 “U” Insert (Heavy)	6005-T5 “U” Insert (Heavy)
	69 inch x 42 inch <sup>(4)</sup>	Conventional 4x4 wood post, <i>The Mount</i> <sup>(6)</sup> , or <i>EZ-Set Post Mount</i>	Glass Balustrade	6005-T5 “U” Insert (Light)	
Stair <sup>(3)</sup>	114-1/2 inch x 42 inch	Conventional 4x4 wood post or <i>The Mount</i> <sup>(6)</sup>	Spindle or Picket	6005-T5 “U” Insert (Heavy)	
	112 inch x 42 inch	<i>EZ-Set Post Mount</i> <sup>(5)</sup>			
	67-1/2 inch x 42 inch <sup>(4)</sup>	Conventional 4x4 wood post, <i>The Mount</i> <sup>(6)</sup> , or <i>EZ-Set Post Mount</i>	Glass Balustrade	6005-T5 “U” Insert (Light)	

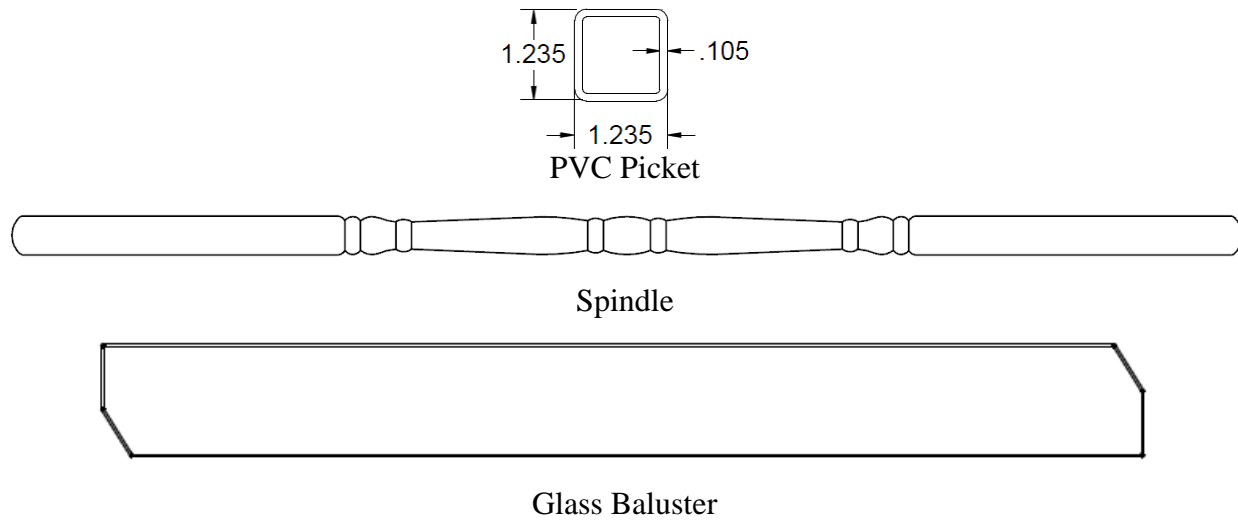
- (1) The use of these products shall be limited to exterior use as a guard system for balconies and porches for one- and two-family dwellings of Type V-B (IBC, FBC) construction and structures constructed in accordance with the IRC. Excluding High Velocity Hurricane Zone (HVHZ).
- (2) Level rail lengths are maximum clear length between supports. Railing height is the minimum installed height from walking surface to top of top rail.
- (3) Stair rail lengths are the sloping clear distance between supports. Stair heights indicate minimum allowed height as measured vertically from the leading edge of the stair nose.
- (4) Excluding wind-borne-debris regions.
- (5) Installation on structural wood framing only.
- (6) Installation on concrete only.

**TABLE 3 – OXFORD GUARDRAIL SYSTEMS FOR IBC AND FBC OCCUPANCIES (1)**

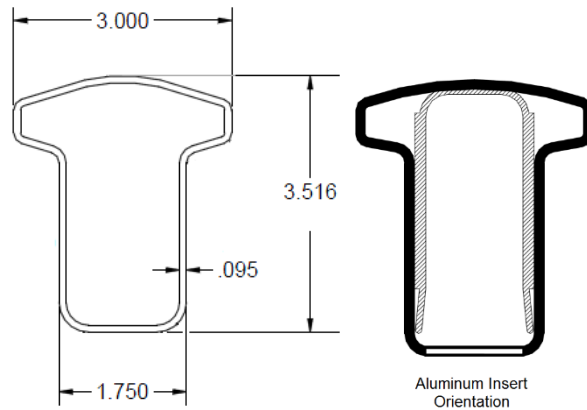
Type	Maximum Guardrail Dimensions	Support Post	Baluster	Aluminum Reinforcement	
				Bottom Rail	Top Rail
Level <sup>(2)</sup>	91 inch x 42 inch	Conventional 4x4 wood post or <i>The Mount</i> <sup>(4)</sup>	Spindle or Picket	6005-T5 “U” Insert (Heavy)	6005-T5 “U” Insert (Heavy)
Stair <sup>(3)</sup>	87 inch x 42 inch	Conventional 4x4 wood post or <i>The Mount</i> <sup>(4)</sup>	Spindle or Picket	6005-T5 “U” Insert (Light)	

- (1) Guardrails are qualified up to and including the listed maximum guardrail system dimensions for use in all use groups under the IBC and FBC. Excluding High Velocity Hurricane Zone (HVHZ).
- (2) Level rail lengths are maximum clear length between supports. Railing height is the minimum installed height from walking surface to top of top rail.
- (3) Stair rail lengths are the sloping clear distance between supports. Stair heights indicate minimum allowed height as measured vertically from the leading edge of the stair nose.
- (4) Installation on concrete only.

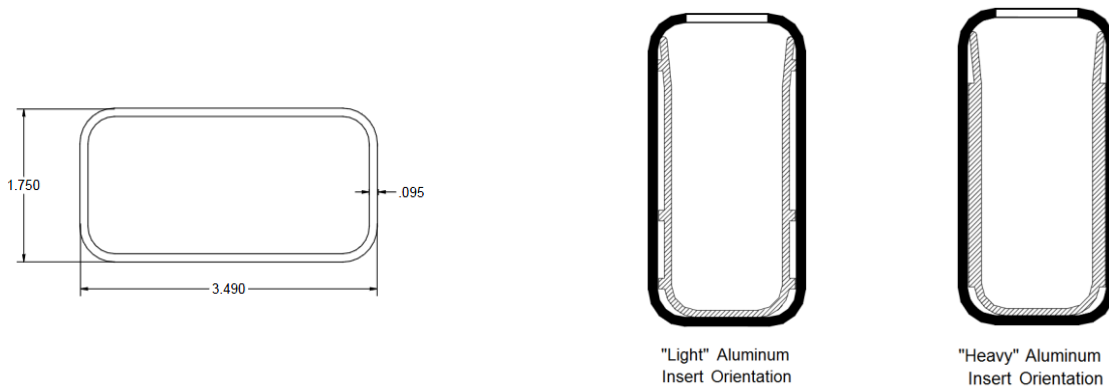




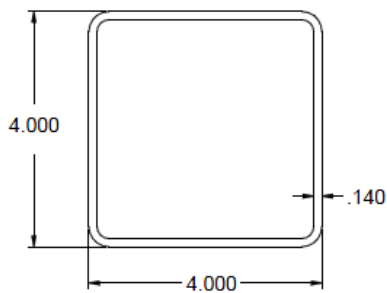
**FIGURE 1 – BALUSTERS**



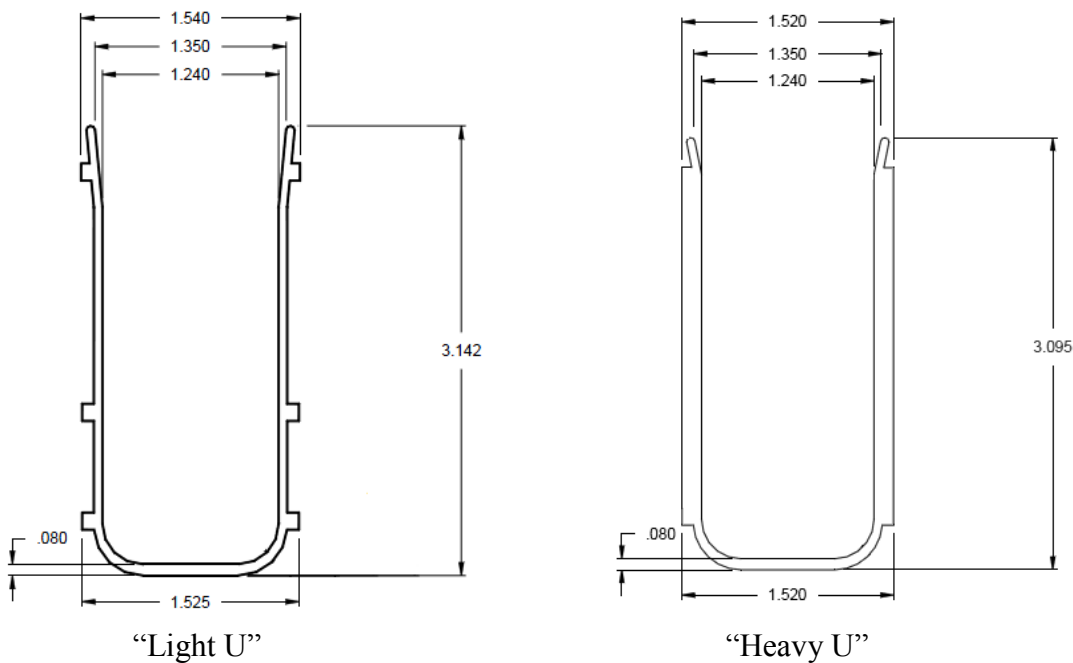
**FIGURE 2 – TOP RAIL PROFILE**



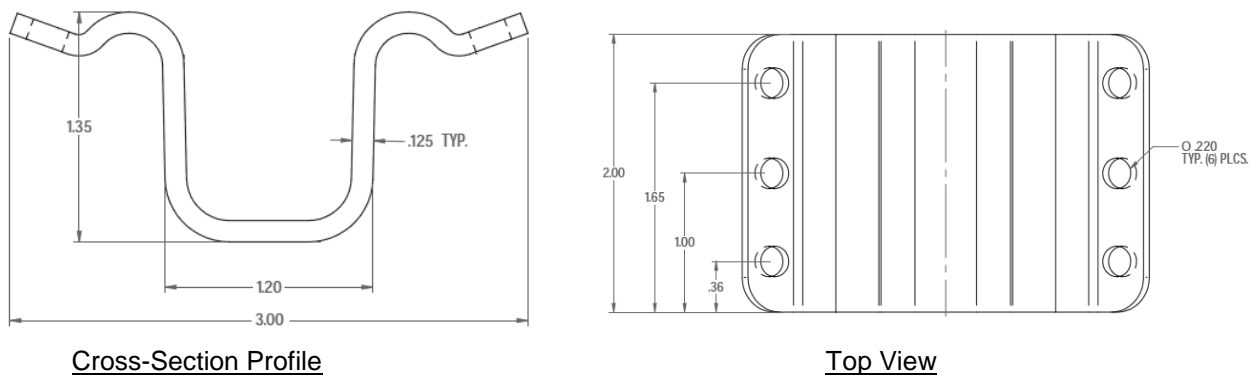
**FIGURE 3 – BOTTOM RAIL PROFILE**



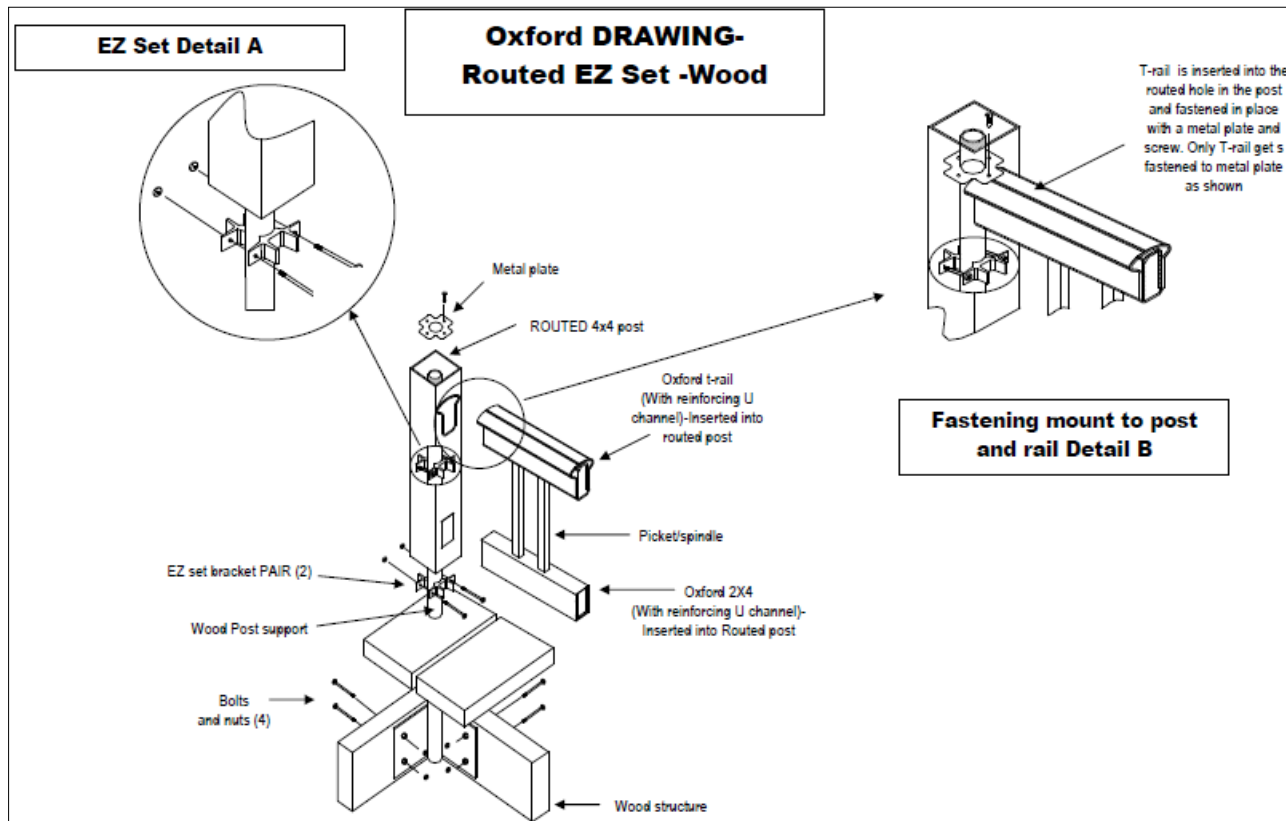
**FIGURE 4 – POST SLEEVE**



**FIGURE 5 – ALUMINUM REINFORCING INSERTS**



**FIGURE 6 – ALUMINUM MOUNTING BRACKET**



**FIGURE 7 – EZ-SET POST MOUNT WOOD DECK INSTALLATIONS**

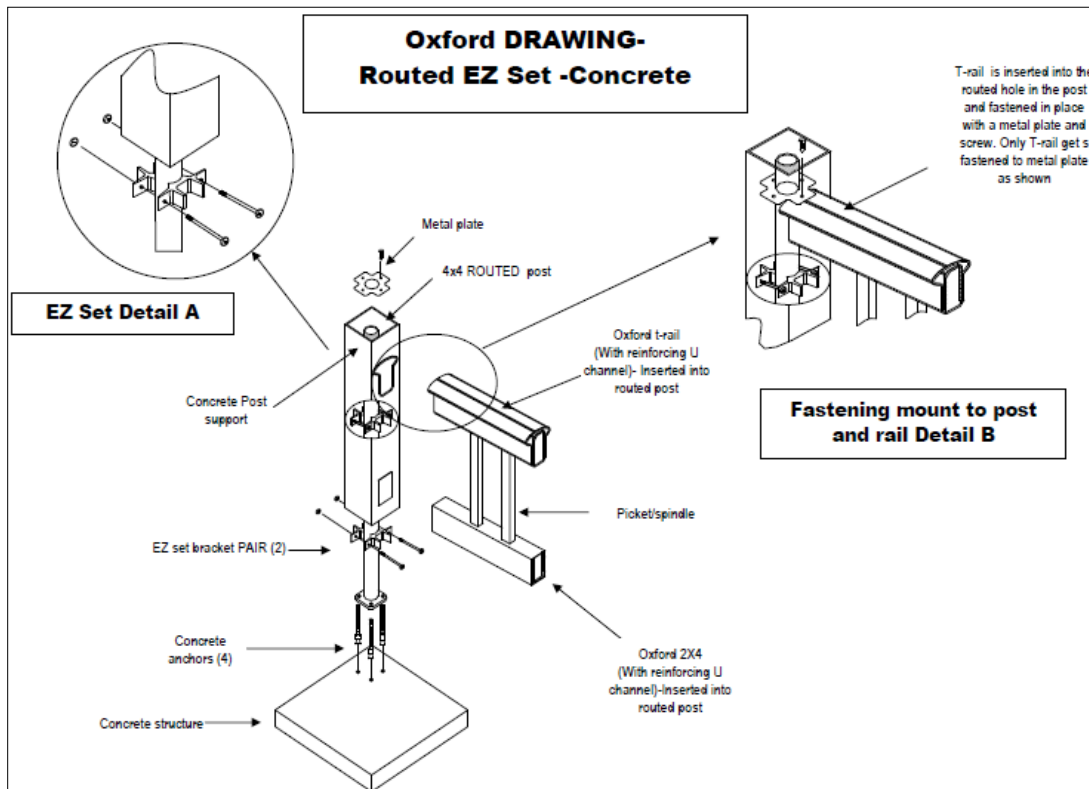
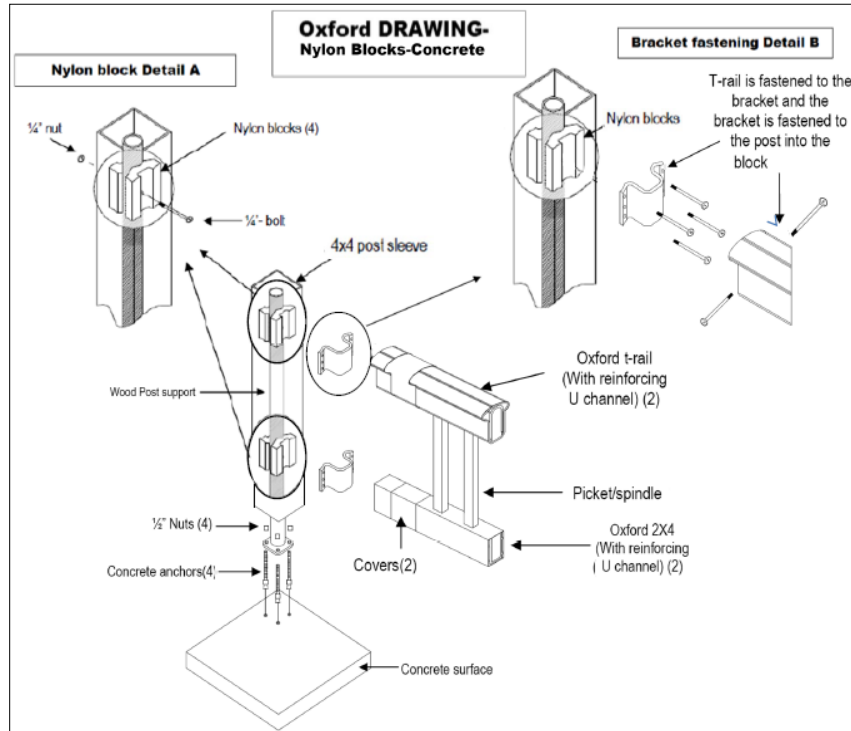
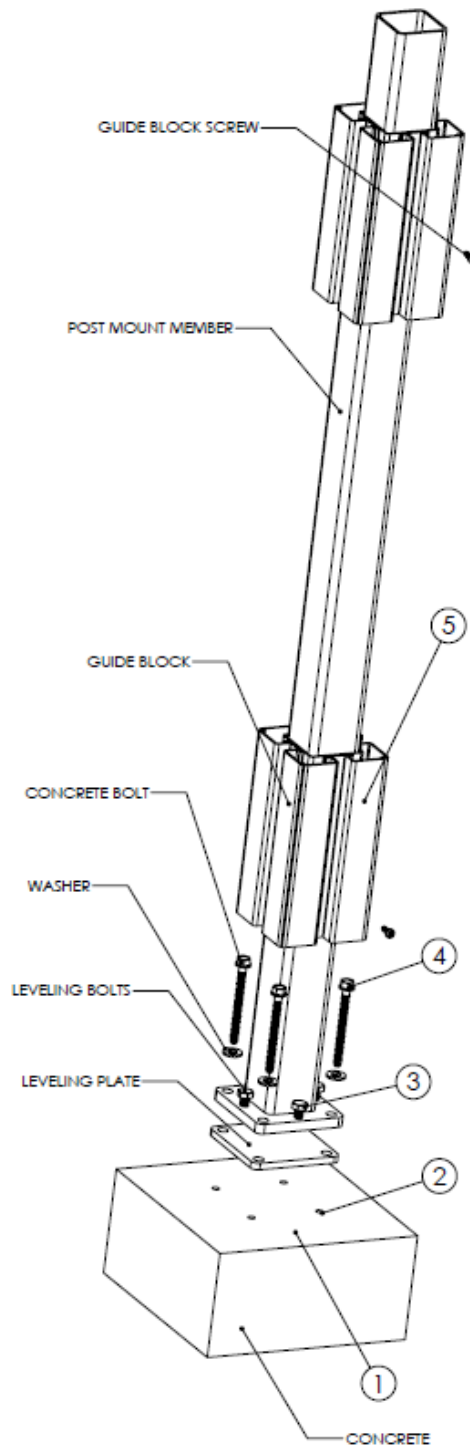


FIGURE 8 – EZ-SET POST MOUNT CONCRETE INSTALLATIONS



**FIGURE 9 – THE MOUNT (ALSO KNOWN AS THE LMT BLU-MOUNT) CONCRETE INSTALLATION**