



Code Compliance Research Report

CCRR-0147

Subject to Renewal: 06/09/2018

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1.0 Subject

PolyRAIL Systems TRX Vinyl Guardrail System

2.0 Research Scope

2.1. Building 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 (FBC) - Excluding
High-Velocity Hurricane Zones

2.2. Properties:

Structural Performance

Durability

Surface Burning

Decay Resistance

Termite Resistance

3.0 Description

3.1. General – The TRX Vinyl Guardrail Systems described in this report are guards and guardrails under the definitions of the referenced codes. They are intended for use at or near the open sides of elevated walking areas of buildings and walkways as required by the referenced codes.

3.2. Guardrail systems include a top and bottom rail, with aluminum inserts, vertical balusters, post sleeves, rail-to-post brackets, foot blocks and decorative moldings.

3.3. Rails, post sleeves, foot blocks, balusters and decorative moldings are extruded Polyvinyl Chloride (PVC) produced in a single color; White.

3.4. All top rails are provided with an aluminum insert with a 'T' profile. All bottom rails are provided with an aluminum insert with a 'U' profile. All rail inserts are extrusions of 6063-T6 aluminum. See Figure 2.

3.5. Level guards with heights of up to 42 inches above the floor surface are provided in lengths up to 8 feet as measured from inside-to-inside of supports.

3.6. The top assembly consists of one rail, and is attached to each support with a single PVC bracket. The top rail is a 'T' profile and is 1.75 inches high by 3.25 inches wide See Figure 1.

3.7. The bottom assembly consists of one rail, and is attached to each support with a single PVC bracket. The bottom rail is 1.75 inches square. See Figure 1.

3.8. Balusters are extruded PVC and are 1.375 inches square. The balusters are placed through routed openings in both the top and bottom rails to provide a means for securing the balusters in the rails.

3.9. The baluster spacing resulting from assemblies recognized in this report shall provide spacing such that a 4 inch diameter sphere cannot pass through any opening between balusters.

3.10. Post sleeves are 4 inches square and have a wall thickness of 0.13 inch

3.11. The 4x4 inch Support post is a 3-5/8 inch square shaped tube with a .060 inch wall constructed of 6005-T5 extruded aluminum containing eight internal screw slots. The post is fastened to 1 of two 5-1/2 in aluminum base plates.

3.12. The 1/2 inch thick 6061 – T6 aluminum base plate is attached to the support post with eight 5/16-18 by 2-1/2 inch stainless steel screws and is approved for use in IBC and IRC installations. See figures 5 & 6.

3.12.1 The 1/4 inch thick 6063-T6 aluminum base plate is attached to the support post with four 5/16-18 by 2-1/2 inch stainless steel screws and is approved in IRC installations only. See figure 7.

4.0 Performance Characteristics

4.1. The guardrail systems described in this report have demonstrated the capacity to resist the design loadings specified in Chapter 16 of the IBC & FBC and Section R301 of the IRC & FRC when tested in accordance with ICC-ES AC174.

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. PVC materials used have a flame spread index not exceeding 200 when tested according to ASTM E 84.

5.0 Installation

5.1. Installation shall be in accordance with the manufacturer's installation instructions and this report. Where differences occur between this report and the manufacturer's installation instructions, this report shall govern.

5.2. The top and bottom rail assemblies are attached to PVC sleeved conventional wood posts or other supporting structure with a mounting bracket. See Figure 3.

5.3. One mounting bracket attaches to each end of the upper rail using two (2) #8 by 0.75 inch, self-drilling, pan-head screws. The brackets are attached to the supports using two (2) #12 by 1.25 inch, thread-cutting, Type 17, pan-head screws.

5.4. One mounting bracket attaches to each end of the lower rail using two (2) #8 by 0.75 inch, self-drilling, pan-head screws. The brackets are attached to the supports using four (4) #12 by 1.25 inch, thread-cutting, Type 17, pan-head screws.

5.5. Foot blocks are intermediate bottom rail supports and are installed between the deck surface and the rail at the mid-point of the rail and consist of a 2.0 inch section of baluster and a 1.312 inch by 0.625 inch HDPE block. The HDPE block is attached to the bottom rail utilizing two (2) #12 by 1.25 inch thread cutting screws. The baluster section is attached to the HDPE block utilizing two (2) #8 by 0.75 inch self-drilling screws.

5.6. The 4 x 4 post mounts utilize 2 leveling plates under the baseplate along with four adjustable bolts through the baseplate. The leveling plates are secured by the baseplate mounting hardware passing through holes in the leveling plates when secured to supporting structure.

5.7. The wood in the supporting structure including support posts 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.

6.0 Supporting Evidence

6.1. Drawings and installation instructions submitted by the manufacturer.

6.2. The reports of testing and engineering analysis demonstrating compliance with the performance requirements of ICC-ES AC174 "Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)", revised February 2014 .

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

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

7.0 Conditions of Use

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

7.1. Guardrail systems recognized in this report may be used in One- and Two-Family Dwellings regulated by the IRC, FBC residential, and all construction types regulated by the IBC and FBC in accordance with IBC and FBC Section 1406.3, Exception 2. See Table 1 for additional restrictions based upon Use and Occupancy classification.

7.2. Conventional wood supports including support posts for guards 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 & FBC and Section R301 of the IRC & FRC and must provide suitable material for anchorage of the rail brackets (See 5.6 under "Installation"). Where required by the building official, engineering calculations and details prepared by a licensed design professional shall be provided.

7.3. Anchorage of the 4x4 post mount is not within the scope of this report and is subject to evaluation and approval by the building official. Anchors must satisfy the load requirements of Chapter 16 of the building code and must meet the following minimum requirements:

7.3.1. A minimum of four anchor bolts with a minimum diameter of 3/8 inch must be used and located in the four pre-drilled holes in the post mount base plate.

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

7.3.3. For post installation on concrete or other rigid supports (such as structural steel), the installation uses four 3/8 inch diameter anchor bolts located in the pre-drilled holes in the structural post base plate. 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.

7.3.4. Where required by the building official, engineering calculations shall verify that the anchorage and supporting structure complies with the building code for the type and condition of the supporting construction.

7.4. All aluminum components in contact with wood shall be factory painted or given a heavy coat of alkali-resistant bituminous paint to provide barrier protection from moisture absorbed in wood. Compatibility of fasteners with the supporting structure, including chemically treated wood, is not within the scope of this report.

7.5. All products are manufactured in Bremen, Indiana by Digger Specialties, Inc. in accordance with the manufacturer's approved quality control system with inspections by NTA, Inc. (AA-682).

8.0 Identification

The composite guard assemblies produced by Digger Specialties, Inc. identified in this report, shall be identified with labeling on the individual components or the packaging and include the following;

8.1. Name and/or trademark of the manufacturer and the manufacturers address

8.2. The identifying mark and/or name of the independent inspection agency, NTA (AA-682)

8.3. The Architectural Testing registered mark and CCRR number (CCRR-0147).

8.4. The statement "See ATI CCRR-0147 at www.ati-es.com for uses and performance levels."

9.0 Code Compliance Research Report Use

9.1. 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.

9.2. Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Architectural Testing.

9.3. Reference to the Architectural Testing internet web site address at www.archtest.com is recommended to ascertain the current version and status of this report.

**Table 1 – Guardrail System and Use Categories**

Name	<u>Guardrail Type</u>	<u>Code Occupancy Classification</u>¹			
		<u>IBC</u>	<u>IRC</u>	<u>FBC</u>	<u>FBC-Residential</u>
<i>PolyRAIL Systems TRX Vinyl Guardrail System</i>	Level	8' x 42" ALL USE GROUPS	8' x 42"	8' x 42" ^{2,3} ALL USE GROUPS	8' x 42" ^{2,3}

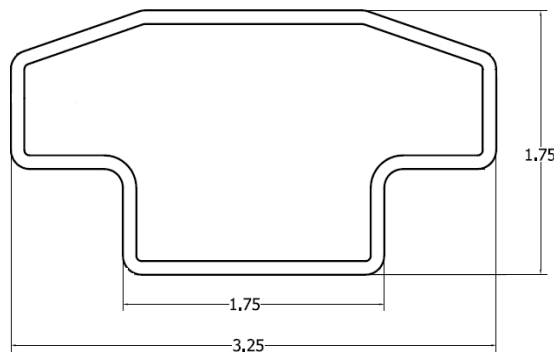
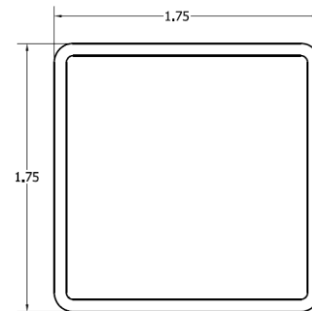
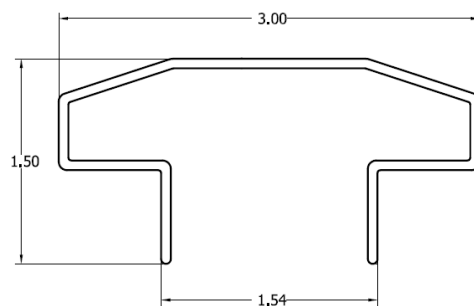
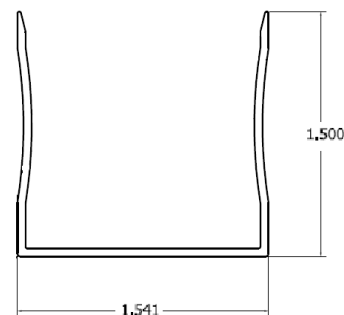
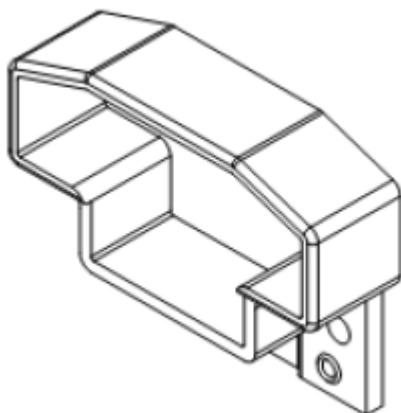
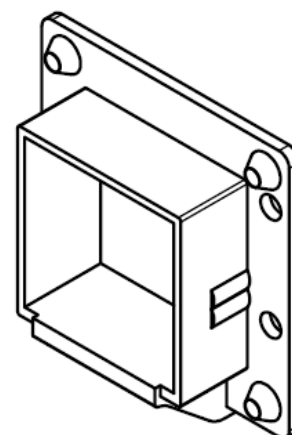
¹ Guardrails are qualified up to and including the listed maximum guardrail system dimensions for use in the referenced Code Occupancy Classification.

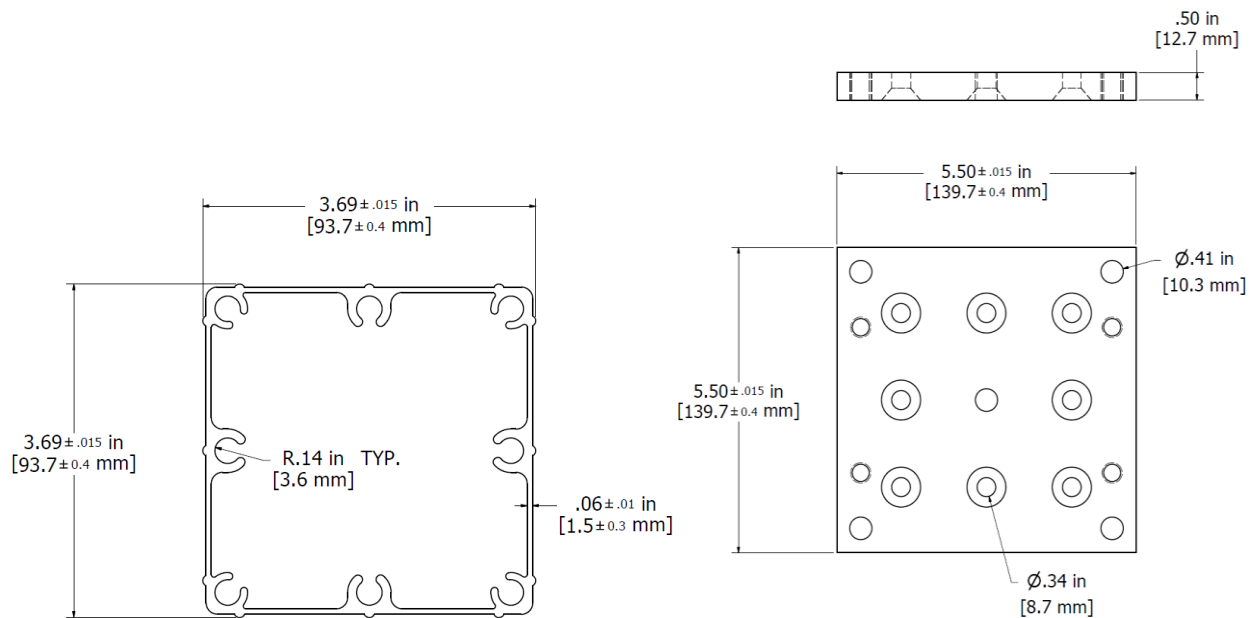
² Excluding wind-borne-debris regions

³ Excluding High-Velocity-Hurricane-Zone (HVHZ)

Table 2 – Fastener Schedule

Connection	Fastener
Top or Bottom Rail Bracket to Rail	Two #8-18 x 3/4 in (0.120 in minor dia.), self-drilling, pan-head, zinc-coated stainless steel screws
Top Rail Bracket to Post	Two #12-11 x 1-1/4 in (0.155 in minor dia.), Type 17 point, pan-head, zinc-coated stainless steel screws
Bottom Rail Bracket to Post	Four #12-11 x 1-1/4 in (0.155 in minor dia.), Type 17 point, pan-head, zinc-coated stainless steel screws
Bottom Rail Support to HDPE Block	Two #8-16 x 3/4 in (0.120 in minor dia.), Type 17 point, pan-head, zinc-coated stainless steel screws
HDPE Block to Bottom Rail	Two #12-11 x 1-1/4 in (0.155 in minor dia.), Type 17 point, pan-head, zinc-coated stainless steel screws
Baluster to Rail	Locking tabs at the baluster ends engaged the balusters in the rails
Post to Base Plate	1/2 Inch base plate Eight 5/16-18 by 2-1/2 in (0.255 in minor diameter) trim-head, torx-drive, stainless steel screws
	1/4 Inch base plate. (IRC and FBC Residential only) Four 5/16-18 by 2-1/2 in (0.255 in minor diameter) trim-head, torx-drive, stainless steel screws
Post Mount to Substructure	3/8 in Grade 5 hex-head bolts with nut and washer (See Section 7.3)


Top 'T' Rail Profile

Bottom Rail Profile
Figure 1 – Rail Profiles

Top Rail

Bottom Rail
Figure 2 - Aluminum Rail Inserts

Top

Bottom
Figure 3 – Mounting Brackets



**Figure 4 - 4 x 4 Post Mount
Aluminum Insert**

**Figure 5 - 4 x 4 Post Mount
Base Plate (IBC)**

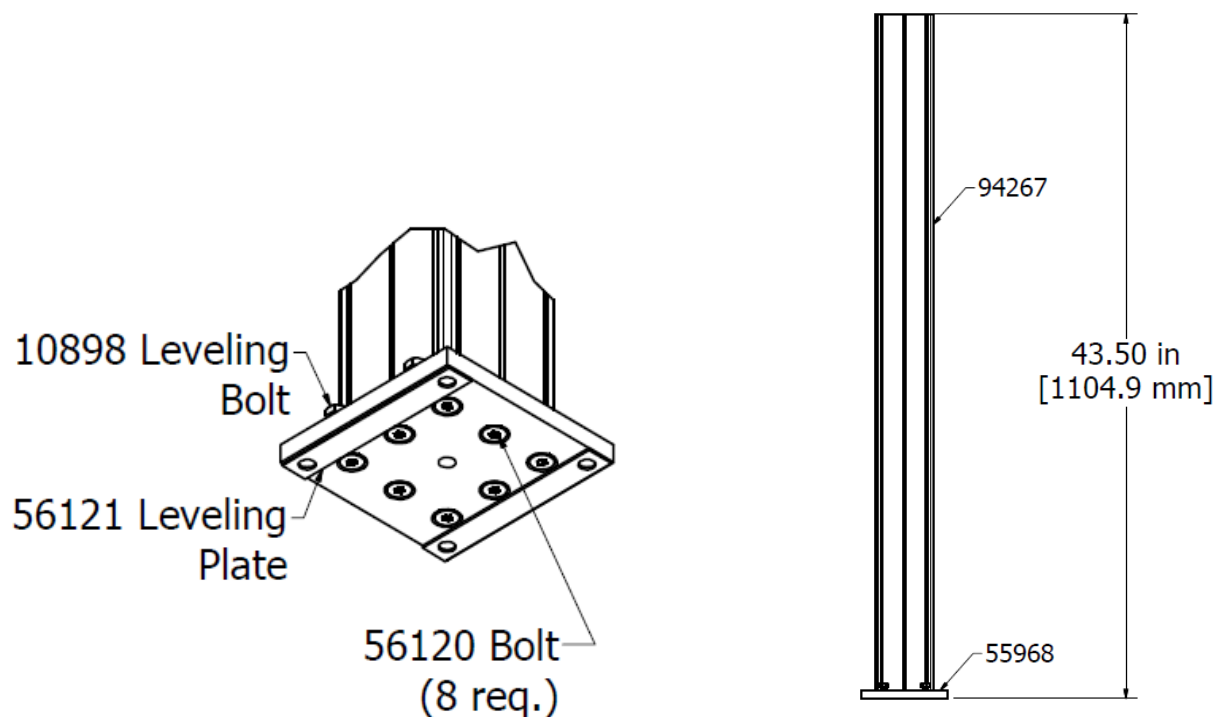
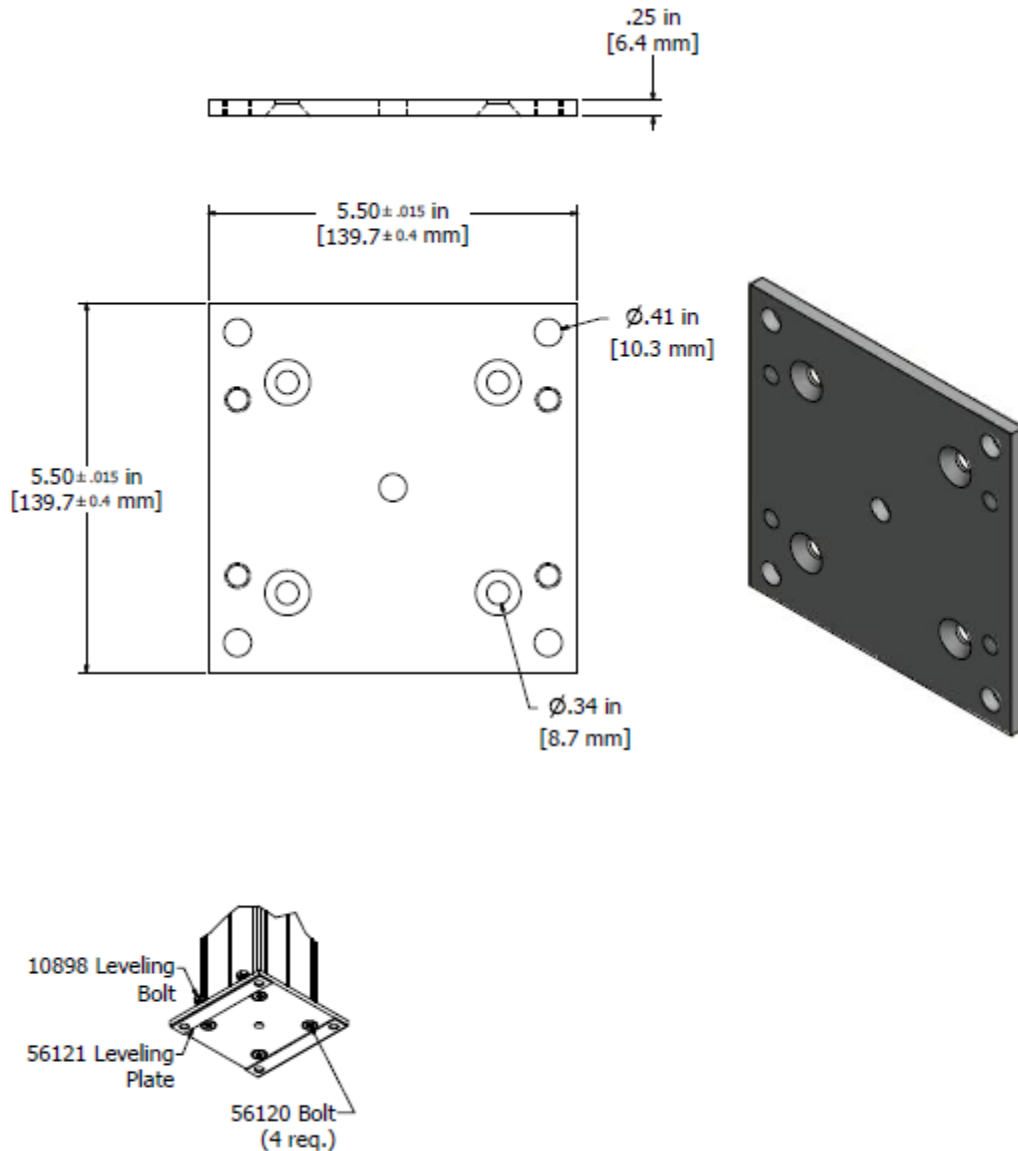


Figure 6 - 4 x 4 Post Mount assembly



**Figure 7- 4 x 4 Post Mount
Base Plate (IRC and FBC Residential Only)**