

Guardrails for Building Safety

by Jim Reinhardt

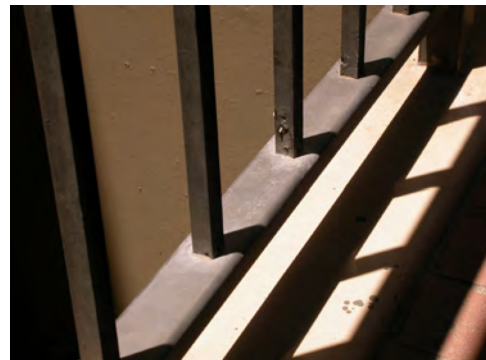
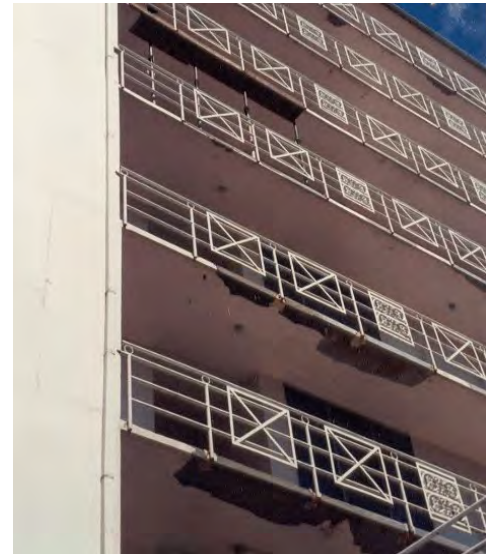
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In the last few years, Hawaii has seen at least two fatal and one near fatal falls that resulted from guardrail failures. Guardrails are those little “fences” that keep people from falling off the edges of corridors, lanais or similar walking surfaces. They’re required where ever the walking surface is more than 30" above the ground beneath. Handrails are the bars that you hold to support yourself along edges of stairs. Stairs usually have guardrails as well as handrails.

The performance standards for guardrails have changed substantially over time. In the early ‘70’s, most building codes allowed guardrails to have pickets or a decorative pattern spaced so that a ball 9" or larger could not pass thru. Honolulu reduced that to 5" for residential buildings. By 1991, the Honolulu building code reduced that maximum allowable spacing to 4". There are, however, many buildings which still have the old 9" spacing.

Building codes require lanai guardrails to be able to resist a force of 20 lbs per linear foot applied horizontally to the top rail. If the spacing of the guardrail posts is 6', the guardrail would have to be able to resist a force of 120 lbs pressing outward on the top bar. For an walkway that is part of a building exit path, such as the landing of an exit stair, the guardrail must be able to resist a horizontal force of 50 lbs per linear foot. Those requirements haven’t changed in at least 40 years.

As a general rule, if a building complied with the building code at the time it was constructed, the owners aren’t required to modify parts that no longer comply because the code has changed. An owner is, however, required to maintain the building in a safe condition. That means if a guardrail had 9" picket spacing when it was built, the owner is not required to change it, but the owner is required to maintain the guardrail so that it has its original strength. In Hawaii’s moisture and salt-laden atmosphere, that is a major challenge. Most guardrails, even the aluminum ones, have steel fasteners. An while the aluminum won’t rust, it does corrode when exposed to salt and moisture. If the screws fastening the guardrail to the wall fail, the guardrail won’t resist the weight of a person leaning on it. If the fasteners which connect the pickets to the bottom rail fail, the pickets won’t resist the



weight of a child leaning on it.

In buildings with concrete floors, we frequently see failures where the guardrail post is buried in the slab. Water collects in the guardrail post, causing the slab reinforcing to rust. Steel expands as it rusts, so the concrete around the post base cracks (spalls), weakening the connection. At one highly publicized recent guardrail fall, spalling at post bases had significantly weakened the post bases and the building was being repaired by a contractor. Unfortunately, the lanai doors were not closed to prohibit access to the lanais. Two people leaned against the guardrail, not realizing that the rail no longer had any strength, and the guardrail gave way. The lesson here is, when the guardrails are being repaired, take steps to guaranty that no one can get to the unprotected areas.



In another guardrail accident, a person was injured while climbing up the outside of a high-rise building. The person grabbed onto one of the lower parts of the guardrail which gave way because it was weakened from corrosion. While the idiot shouldn't have been climbing up the outside of the building, he nevertheless sued the building owners because the guardrail didn't provide the building code required strength.



For buildings with wood guardrails (usually homes or low-rise apartments), the wood supports deteriorate over time due to decay, termite damage and erosion of the wood by exposure to UV and water. And once again, the fasteners are frequently a problem. Nails, even when buried in wood, rust and loose strength.

How can an owner or building manager identify guardrails which are potentially dangerous? Two steps are a start. First closely examine the connections of the railing to the floor and/or walls. How is the guardrail fastened in place? Are the fasteners rusted? Is the wall or floor sound where the guardrails connect? Is there spalling or other deterioration? Aluminum makes a powdery white substance as it corrodes. Look for the white powder around connection points. Look for small holes thru the aluminum. Look for rust. Second, and this requires a little advance preparation, give the railing a vigorous shaking. And I mean VIGOROUS. Really shake it. Before you do this, however, be sure that if (when) the railing gives way, that you don't go with it. Tie yourself off to a strong connection point with a strong rope. Remember, the railing may well give way!

The final way to determine if the guardrail has its code required strength is to have it examined by an engineer, architect or qualified building inspector.