



Lean on Me: Design, Specification and Selection of Guardrails and Handrails

An Online Continuing Education Course for Engineers

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Introduction

With site development driving up preconstruction expenses, high-rise construction is increasing. Much of this growth is occurring in multi-family residential structures being built to alleviate a shortage of housing in developed urban areas. Most of these incorporate at least a small outdoor living area or balcony. The necessary railings for these form a big part of the visual impact of such projects. Their initial and continued appearance will matter to developers. However, railings must first and foremost, meet code requirements like those in the commercial IBC or residential IRC.

Because of differing projects, different project types, different regional influences, and different suppliers, architects usually create customized designs and specifications for railings on each job. It would be nice if there were a single universal system or approach to railing procurement — a system allowing a single set of specifications and details to be created and then reused.

What would take for such to be made available? There would need to be enough standardized aesthetic railing systems, materials, and styles to satisfy both commercial and residential markets. The products themselves would need to be simple to install and yield consistent results. Even better would be reliable one-stop shops, with whom a designer could partner on projects needing railing systems.

If such resources were available, they would be a huge asset to architectural firms.

Course Objectives

This course will cover key factors to consider in the design of railings. These will include; building code requirements, fall prevention concerns, choices in materials, secure installation options, and aesthetic options. These should all be considered when choosing or specifying a guardrail system for restoration or new construction project.

In a bit more detail, in our time together, we will focus on the following learning objectives. Our goals are to:

- Explore code compliance and how product standardization helps meet that goal
- Increase familiarity with ADA guidelines and other regulations that must be satisfied in the design of railings
- Discuss proper mounting of different railing systems, being installed on different types of construction
- Become acquainted with different material, design and finish options for railings and dividers
- Provide available resources to streamline design decisions regarding railings and privacy dividers.
- Learn about styles and trends in aluminum and composite railing systems and discuss how railing material choices affect appearance, lifespan, and maintenance
- Address how standardized railing systems, with attendant standard details and master specifications, simplify each step of a railing project
- Present issues faced in railing replacements in important projects, as well as ways to accommodate needed historical detailing.
- Demonstrate advantages of establishing a working relationship with a quality fabricator, especially in renovation projects

Code Compliance

As with most aspects of the creation of buildings, the aesthetic design of railings gets you the approval of the customer, but code compliance to obtain regulatory approvals must be met before the work is complete.

When it comes to railings, what is involved in complying with ADA guidelines and building codes? Note that ADA requirements are mere suggestions, till they are referenced into adopted local or state building codes and standards. Then they become law. Most ADA guidelines are mirrored in local codes.

What is typically required by building codes? To begin with, there are definite differences between guardrail and handrail requirements, found in loading mandates and dimensional requirements. We will touch on these later.

Besides building codes, there are other regulatory agencies with guidelines to which railing design must adhere. These will be discussed briefly.

Railing systems themselves can be certified through the CCRR process, but this certification still does not cover required project-specific fasteners. If the project is straightforward, engineering for fasteners can usually be also be provided by the supplier. If the project requires closer attention to fastening details, a local engineer can be hired to verify that proper fasteners are utilized.

No one wants to be involved with a railing system that fails.

Complying with ADA / Building Codes

The best designs for railings in historic buildings will be those that meet current code requirements, while also acknowledging or duplicating existing remaining detailing. Satisfying

both needs represents a win-win for the project. However, satisfying code requirements begins with an understanding of where the legal restrictions on what we design originate.

The ADA (Americans with Disabilities Act) is not a building code. It is a civil law that often contains the most stringent design recommendations to accommodate disabled users. Building inspectors are not supposed to enforce ADA compliance, but sections of the ADA have often been excerpted and incorporated as local laws. Some examples of ADA suggestions often incorporated into building codes are as follows.

- If a walking surface has a slope of 1:20 or more, an installed handrail is required. The railing should run the entire length of the ramp.
- These requirements do not apply to handrails in elevators or lifts.
- When a ramp's rise is greater than 6 inches, a handrail is required on both outer edges.
- The handrail also must extend for at least 12 inches past the bottom and the top of all ramps.
- Handrails on stairs must be continuous, lining both sides of every stair, as well as around the platforms in between.
- At the top of stairs and ramps, rails should extend for at least 12 inches above the surface of the landing, and at the bottom, they should extend a minimum of 12", or the length of one tread.
- In general, all handrails must be positioned between 34 and 38 inches above the walking surface, ramp or stair.
- If the principal users are children, an additional handrail can be added, positioned no more than 28 inches from the ground.

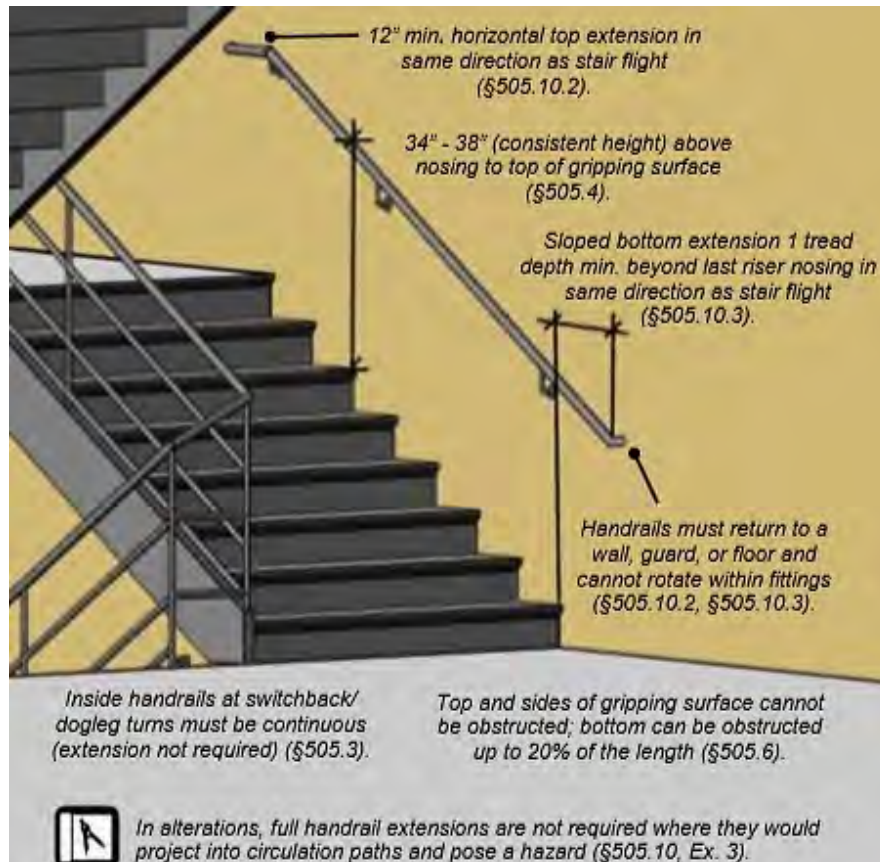


Image excerpted from the US Access Board Technical Guide Stairways.

National and Local Building Code Requirements

A brief listing follows as an example of different versions of various codes that must be satisfied in New York, New Jersey and Connecticut (at the time that this course was published). This list is specific to work in New York City, which like many other large urban centers, has created their additional building regulations. Requirements from model codes tend to be adopted everywhere. However, before proceeding with a design, it is important to determine whether additional requirements have been imposed by more stringent local codes.

- New York State adopted the 2015 IBC (International Building Code), with their own 2017 supplement, which they published.

- The current New York City Building Code is the 2014 New York City Building Code. They are expected to come out with an update soon which will mirror the latest IBC code, but there was no concrete information available on when that might take place.
- New Jersey adopted its own 2015 version of the New Jersey Building Code.
- Connecticut adopted the 2012 IBC with their supplement, published in 2016.
- The latest version of the International Building Code is the 2018 IBC. This will eventually be but has not yet been, adopted by most of the previously mentioned jurisdictions.
- Information pertinent to railing design is usually found in but is not necessarily limited to chapters 10, 11, 15, 16, 17 and 24 of state and city building codes that are based on the model provided by the International Building Code.
- Local Law 11 was an earlier mandate passed in New York City, dealing with façade inspections. It was well understood but has now been mostly superseded by regulations entitled FISP and SWARMP, in which fewer people are versed.
- FISP – The recently passed Façade Inspection Safety Program is a New York City building mandate which must be followed, although it is not necessarily a building code. It was created to ensure continued safe operation of buildings, where building components can fail and cause injury to the public. A component can compromise the life and safety of the building.
- SWARMP – The Safety of Windows and Railings Mandate Program is also a New York City building mandate which must be followed, although it is not necessarily a FISP program.
- NYC DOB Local Law 24 of 2014 is a building code that will affect railing in buildings. It will be implemented in phases. It will affect railing in buildings in phases. It will affect railing in buildings in phases. In 2018, all workers on job sites in NYC must be trained and certified for 40 hours in safety. This is doubling down on training for special inspectors, no one will be able to inspect without this training.
- In a recent development, NYC Local Law 24 of 2014, Chapter 3 (23-131) has been introduced. It states that railings cannot exceed 3'-8" in height. The actual text states, "In addition, balconies may be enclosed by "building" walls

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