

# Advanced Code Requirements for Residential Construction

## - Internet Course

### SECTION 1- Permits & Inspections

**Slide 1:** Advanced Code Requirements for Residential Construction

**Slide 2:** Welcome to your continuing education class- **Code Requirements for Residential Construction.**

**Slide 3:** I am your instructor, Becky Boucher! If you have any questions or comments about the course material presented, I encourage you to contact me at the email address shown.

**Slide 4:** By completing this course you will understand:

- the basic minimum home building requirements as outline by the Florida building code
- Recognize the fundamental importance of building code standards and adhering to minimum requirements as such
- You will understand the permitting and inspection process,
- Spatial & Structural concepts & requirements,
- The means of egress system, its components & requirements
- and minimum Mechanical & Plumbing Requirements.

**Slide 5:** Let's get started by reviewing general information about code development and compliance, and specific requirements for obtaining permits and passing inspections!

### **Slide 6: Building Code- Purpose & Intent**

When design professionals are space planning new homes or making changes to existing homes, building codes and standards must always be considered. It is very important for a contractor, architect, interior designer or engineer to know the code. The Building Code is a collection of documents that is used as standard minimum requirements in the construction and alteration of buildings for the safety and health of the building users.

The code embraces all aspects of building construction ranging from fire and structural safety to health, security, energy conservation, accessibility, and other issues concerning the public. (**FBC- Building 101.3 Intent.**)

**Historical Snapshot:** The existence of building regulations goes back almost 4,000 years. The Babylonian Code of Hammurabi decreed the death penalty for a builder if a house he constructed collapsed and killed the owner. If the collapse killed the owner's son, then the son

of the builder would be put to death, and so on. This precedent is worth keeping in mind as you contemplate the potential legal ramifications of your actions in designing and constructing a home in accordance with the code.

### **Slide 7: Building Code- Development**

Generally speaking, building codes are developed by people who are actively involved in the construction industry. However, they are adopted, modified and enforced by government officials.

Building codes are constantly changing and they can vary by state, county, city or town. The Florida Building Code, like a few other states, is patterned after the International Code but has modifications, additions and deletions that are specific to Florida.

In an effort to take advantage of new technologies, new ideas, and specific applications, the Building Code is updated with a new printing every three years, but the most current printing of any set of building codes may not be the specific set of codes that will apply to any given construction project.

In order to learn which codes are being used and how they will affect a project, it is necessary to contact your local building department. They will be able to provide specific information about which building codes are specified for use in the given area.

### **Slide 8: Building Code- Standards & Deviations**

The Building Code has over a thousand referenced standards pertaining to product specifications and performance. They are generally revised on various cycles from one to seven years. Usually product manufacturers have their products tested and/or evaluated to meet several of these standards.

The standards are selected for the intended use of the product with regard to code compliance issues, which can include: strength, effectiveness, fire resistance, durability, quality and safety. (**FBC-Building 104.11 Alternative materials, design and methods of construction and equipment.**)

However, the provisions of the Florida Building Code are not intended to prevent the installation of any material, or to prohibit any design or method of construction which has not been specifically prescribed in the code, provided that any such alternative has been approved.

An alternative material, design or method of construction can be approved if the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of the code, and that the material, method or work proposed is, for the purpose intended, at least the equivalent of that prescribed by the code in quality, strength, effectiveness, fire resistance, durability and safety.

In other words, a contractor may be able to use alternate construction methods or materials, provided he/she can prove - to the satisfaction of the building official - that their way is as good, or better than what the code prescribes.

Give the inspector the information they need, show them the research to support what you want to do. The building official is the senior person in the building department and he or she is the one who makes the final decision.

### **Slide 9: Permit Application:**

The code-enforcement process is normally initiated by an application for a permit to construct or remodel a building. In the state of Florida a permit is required for any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any required impact-resistant coverings, electrical, gas, mechanical or plumbing system, the installation of which is regulated by code, or to cause any such work to be done.  
**(FBC- Building 105.1 Required.)**

To obtain a building permit you must first make an application with the building official, by filing an application in writing on a form furnished by the building department. Each application will have the date of application, and the building code version that is in effect as of that date. **(FBC- Building 105.3 Application for Permit.)** The building official is responsible for processing applications and issuing permits. **(FBC- Building 105.3.1 Action on application.)**

### **Slide 10: Application Requirements:**

An application for a permit is good for 180 days after the date of filing. The building official can grant one or more extensions for no more than 90 days each as long as the extension is requested in writing and has justifiable cause. **(FBC- Building 105.3.2 Time limitation of application.)**

As a condition to receiving a permit, the applicant must show proof that workers' compensation coverage has been provided for employees and contractors have the required licenses. **(FBC-Building 105.3.5 Identification of minimum premium policy.)**

Additionally, the Florida Building Code requires that the permit applicant can adequately demonstrate that construction for the proposed project complies with the code. This is primarily accomplished by submitting construction documents for the project along with the application for permit. **(FBC- Building 107.3 Examination of documents.)**

The building official is authorized by Florida law to interpret or judge what an adequate demonstration for a particular project is, and enforces the provisions of the code. **(FBC- Building**

**107.1 General and 107.2.1 Information on construction documents.**) There are numerous building officials in the state of Florida. They may not all interpret the code the same way, and therefore may not enforce the code in exactly the same way.

### **Slide 11: Construction Documents:**

Within the construction documents each official is looking for sufficient clarity and detail of the location, nature and extent of the work proposed, as well as conformance to the provisions of the building code. **(FBC- Building 107.2.1 Information on construction documents.)**

Specifically, construction documents need to be prepared by a design professional and affixed with their seal as required by Florida law; and they should be dimensioned and drawn upon suitable material. **(FBC- Building 107.1 General and 107.2.1 Information on construction documents.)**

Review of construction documents by the building official shall include the following minimum criteria and documents: a floor plan; site plan; foundation plan; floor and roof framing plan or truss layout; and all exterior elevations. **(FBC- Building 107.3.5 Minimum plan review criteria for buildings.)**

Once the construction documents are reviewed, approved and stamped as “Reviewed for Code Compliance”, one set is kept by the building official, the other set is returned to the applicant to be kept at the job site, and the building permit is issued. Even after the permit is issued, the building official can inspect the approved plans for errors or code violations and require corrections as such. **(FBC- Building 107.3.1 Approval of construction documents and 105.4.1 Permit Intent.)**

Work done should be in accordance with the approved construction drawings, any changes made during construction which deviate from the approved drawings, need to be resubmitted for approval as an amended set of documents. **(FBC-Building 107.4 Amended construction documents.)**

### **Slide 12: Permit Longevity:**

A permit becomes null and void after 6 months if the work has not been started or if the work was started but is suspended or abandoned for a period of 6 months. **(FBC- Building 105.4.1 Permit intent.)** Lack of at least one approved inspection within 180 days of permit issuance will serve as a validation that the job has been suspended or abandoned. **(FBC- Building 105.4.1.3 Permit intent.)**

Once the permit has been issued, a copy must be kept on the jobsite until completion of the project. **(FBC- Building 105.7 Placement of permit.)** The building permit and inspection card must be in plain view on site.

### **Slide 13: Inspections:**

Work that requires a permit is also subject to inspections by the building official. (**FBC- Building 110.1 General.**) A list of required inspections is located on the bottom of the permit placard.

Instructions on scheduling inspections are provided when the permit is issued. It is the applicant's responsibility to ensure that all required inspections are made prior to proceeding with work beyond each successive point. (**FBC- Building 110.6 Approval required.**)

Upon notification from the permit holder, the building official makes these inspections. However, the timing and sequencing of when these inspections occur and what elements are inspected is up to the building official. (**FBC- Building 110.3 Required inspections.**)

If the work passes inspection, then the official will release that portion of the construction, if not, the permit holder will be informed of violations which must be corrected to comply with applicable codes and to proceed with work. (**FBC- Building 110.3 Required inspections.**)

For new dwellings, once all fees are paid and all required inspections are passed and completed, the applicant will be issued a Certificate of Occupancy (commonly called a CO). (**FBC- Building 111.2 Certificate issued.**)

**Slide 14:** That wraps up our discussion of permits and inspections. Before we move on to **Design Criteria** let's have a quick learning exercise to gauge your understanding of the material so far.

### **Slide 15:**

#### **Learning Exercise 1**

## **SECTION 2- Structural Loads & Spaces:**

**Slide 1:** Advanced Code Requirements for Residential Construction

**Slide 2:** Welcome to **Section 2** of Advanced Code for Residential Construction- **Structural Loads & Spaces!**

**Slide 3:** In this portion of the course we will review:

- Creating a Continuous Load Path within a home,
- outline requirements for Interior and Exterior Wall Finishes and Performance Specifications,
- Review Minimum Room Areas and Ceiling Heights, and

- Garage and Carport design.

#### **Slide 4: Creating a Continuous Load Path:**

It is important for design and construction professionals to adhere to basic standards for building a home, starting with the structural frame.

Strengthening the structural frame of a house includes creating a "complete load path" within the home, which is a method of construction that uses a system of wood, metal connectors, fasteners (like nails and screws) and shear walls to connect the structural frame of the house together.

A complete load path is like a chain that ties the house together from the roof to the foundation. A home is more likely to withstand a seismic or high wind event and stay intact when all parts of the house – roof, walls, floors and foundation – are connected together securely.

The Florida Building Code requires all buildings and structures, and all parts thereof, to be constructed in a way that safely support all loads, including dead loads, live loads, roof loads, flood loads and wind loads. (**FBC- Residential R301.1 Application.**) And a continuous load path between foundations, walls, & roofs must be provided. (**FBC- Residential R501.2 Requirements and R601.2 Requirements.**) Let's take a couple minutes to define these terms.

#### **Slide 5: Florida Building Code Loads:**

**Dead Loads-** The weight of materials of construction incorporated into the building, including walls, floors, roofs, ceilings, stairways, finishes, cladding and other architectural or structural items, and the weight of fixed service equipment such as cranes, plumbing stacks and risers, electrical feeders, heating, ventilating and air-conditioning systems and fire sprinkler systems. (**FBC- Building 1602- Definitions and notations.**)

**Live Loads-** Those loads produced by the use and occupancy of the building or other structure and no not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load. (**FBC- Building 1602- Definitions and notations.**)

**Live Loads (Roof)-** Those loads produced (1) during maintenance by workers, equipment and materials; and (2) during the life of the structure by movable objects such as planters and by people. (**FBC- Building 1602- Definitions and notations.**)

**Nominal Loads-** The magnitudes of other design loads including soil, wind, snow, rain, flood and earthquake. (**FBC- Building 1602- Definitions and notations.**)

Constructing homes in accordance with the provisions of the code should result in a system that provides a complete load path, which will transfer of all loads from their point of origin through the load-resisting elements to the foundation. (**FBC- Residential R301.1 Application.**)

### **Slide 6: Exterior Walls:**

Exterior walls of the house must create a weather-resistant exterior wall envelope and include corrosion-resistant flashing. (**FBC- Residential R703.1 General and R703.8 Flashing.**) One purpose of the wall envelope is to prevent the accumulation of water within the wall assembly. (**FBC- Residential R703.1 General.**) One way it can be accomplished is by using weather-resistant sheathing paper such as No. 15 asphalt felt or other approved water-resistive barrier over studs or sheathing of all exterior walls. (**FBC- Residential R703.2 Weather-resistant sheathing paper.**)

Concrete and masonry walls properly constructed and flashed in accordance with code specifications do not require a weather-resistant exterior wall envelope. Also any exterior wall finish materials attached in accordance with this table (**Table R703.4- Weather-resistant siding attachment and minimum thickness**) do not require additional water-resistive barriers. (**FBC- Residential R703.1 General (exception 1) and R703.2 Weather-resistant sheathing paper (exception 2).**)

TABLE R703.4  
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS <sup>b</sup> (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS <sup>b, c, d</sup>					Number or spacing of fasteners		
				Wood or wood structural panel sheathing	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs			
Horizontal aluminum <sup>e</sup>	0.019 <sup>f</sup>	Lap	Yes	0.120 nail 1 $\frac{1}{2}$ " long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail <sup>g</sup>	Not allowed	Same as stud spacing		
	0.024	Lap	Yes	0.120 nail 1 $\frac{1}{2}$ " long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail <sup>g</sup>	Not allowed			
	0.019	Lap	Yes	0.120 nail 1 $\frac{1}{2}$ " long	0.120 nail 2 $\frac{1}{2}$ " long	0.120 nail 2 $\frac{1}{2}$ " long	0.120 nail <sup>g</sup>	0.120 nail 1 $\frac{1}{2}$ " long			
Anchored veneer: brick, concrete, masonry or stone	2	Section R703	Yes	See Section R703 and Figure R703.7 <sup>h</sup>							
Adhered veneer: concrete, stone or masonry <sup>i</sup>	—	Section R703	Yes Note w	See Section R703.6. <sup>j</sup> or in accordance with the manufacturer's instructions.							
Hardboard <sup>k</sup> Panel siding-vertical	See Section R703.3.4	—	Yes	See Section R703.3.4							
Hardboard <sup>k</sup> Lap-siding-horizontal	See Section R703.3.4	Note p	Yes	See Section R703.3.4							
Steel <sup>l</sup>	29 ga.	Lap	Yes	0.113 nail 1 $\frac{3}{4}$ "	0.113 nail 2 $\frac{3}{4}$ "	0.113 nail 2 $\frac{1}{2}$ "	0.113 nail <sup>m</sup>	Not allowed	Same as stud spacing		
Wood structural panel siding <sup>n</sup> (exterior grade)	3/8 - 1/2	Note p	Yes	0.099 nail-2"	0.113 nail-2 $\frac{1}{2}$ "	0.113 nail-2 $\frac{1}{2}$ "	0.113 nail <sup>m</sup>	0.099 nail-2"	6" panel edges, 12" inter. sup.		
Wood structural panel lapsiding <sup>n</sup>	3/8 - 1/2	Note p Note x	Yes	0.099 nail-2"	0.113 nail-2 $\frac{1}{2}$ "	0.113 nail-2 $\frac{1}{2}$ "	0.113 nail <sup>m</sup>	0.099 nail-2"	8" along bottom edge		
Vinyl siding <sup>o</sup>	0.035	Lap	Yes	See Section R703.11							
Wood rustic, drop	3/8 Min	Lap	Yes	Fastener penetration into stud-1"							
Shiplap	19/32 Average	Lap	Yes								
Bevel	7/16										
Butt tip	3/16	Lap	Yes								
Fiber cement panel siding <sup>p</sup>	5/16	Note q	Yes Note u	6d common corrosion-resistant nail <sup>r</sup>	6d common corrosion-resistant nail <sup>r</sup>	6d common corrosion-resistant nail <sup>r</sup>	6d common corrosion-resistant nail <sup>r, v</sup>	4d common corrosion-resistant nail <sup>r</sup>	6" o.c. on edges, 12" o.c. on intermed. studs		
Fiber cement lap siding <sup>p</sup>	5/16	Note s	Yes Note u	6d common corrosion-resistant nail <sup>r</sup>	6d common corrosion-resistant nail <sup>r</sup>	6d common corrosion-resistant nail <sup>r</sup>	6d common corrosion-resistant nail <sup>r, v</sup>	Note t			

This minimum requirement for an exterior envelope provides a uniform standard of energy efficiency along with ventilating, air-conditioning and water heating systems.

All exterior walls must also have component and cladding loads capable of resisting design pressures outlined by this table. (**Table R301.2(2)- Component and Cladding Loads for a Building with a Mean Roof Height of 30 Feet Located in Exposure B (psf)**) These design pressures are determined by several factors including: basic wind speed, the effective wind area of the wall, roof height and contextual exposure of the building. (**FBC- Residential R703.1.3 Load resistance.**)

TABLE R301.2(2)  
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN  
ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)<sup>a, b, c, d, e</sup>

ZONE	EFFECTIVE WIND AREA (feet <sup>2</sup> )	Ultimate Design Wind Speed V <sub>uk</sub> (mph)																		
		110		115		120		130		140		150		160		180		200		
Roof > 0 to 7 degrees	1	10	8.9	-21.8	9.7	-23.8	10.5	-25.9	12.4	-30.4	14.3	-35.3	16.5	-40.5	18.7	-46.1	23.7	-58.3	29.3	-72.0
	1	20	8.3	-21.2	9.1	-23.2	9.9	-25.2	11.6	-29.6	13.4	-34.4	15.4	-39.4	17.6	-44.9	22.2	-56.8	27.4	-70.1
	1	50	7.6	-20.5	8.3	-22.4	9.0	-24.4	10.6	-28.6	12.3	-33.2	14.1	-38.1	16.0	-43.3	20.3	-54.8	25.0	-67.7
	1	100	7.0	-19.9	7.7	-21.8	8.3	-23.7	9.8	-27.8	11.4	-32.3	13.0	-37.0	14.8	-42.1	18.8	-53.3	23.2	-65.9
	2	10	8.9	-36.5	9.7	-39.9	10.5	-43.5	12.4	-51.0	14.3	-59.2	16.5	-67.9	18.7	-77.3	23.7	-97.8	29.3	-120.7
	2	20	8.3	-32.6	9.1	-35.7	9.9	-38.8	11.6	-45.6	13.4	-52.9	15.4	-60.7	17.6	-69.0	22.2	-87.4	27.4	-107.9
	2	50	7.6	-27.5	8.3	-30.1	9.0	-32.7	10.6	-38.4	12.3	-44.5	14.1	-51.1	16.0	-58.2	20.3	-73.6	25.0	-90.9
	2	100	7.0	-23.6	7.7	-25.8	8.3	-28.1	9.8	-33.0	11.4	-38.2	13.0	-43.9	14.8	-50.0	18.8	-63.2	23.2	-78.1
	3	10	8.9	-55.0	9.7	-61.8	10.5	-65.4	12.4	-76.8	14.3	-89.0	16.5	-102.2	18.7	-116.3	23.7	-147.2	29.3	-181.7
	3	20	8.3	-45.5	9.1	-52.2	9.9	-54.2	11.6	-63.6	13.4	-73.8	15.4	-84.7	17.6	-96.3	22.2	-121.9	27.4	-150.5
	3	50	7.6	-33.1	8.3	-39.4	9.0	-39.3	10.6	-46.2	12.3	-53.5	14.1	-61.5	16.0	-69.9	20.3	-88.5	25.0	-109.3
	3	100	7.0	-23.6	7.7	-19.8	8.3	-28.1	9.8	-33.0	11.4	-38.2	13.0	-43.9	14.8	-50.0	18.8	-63.2	23.2	-78.1
Roof > 7 to 27 degrees	1	10	12.5	-19.9	13.7	-37.9	14.9	-23.7	17.5	-27.8	20.3	-32.3	23.3	-37.0	28.5	-42.1	33.6	-53.3	41.5	-65.9
	1	20	11.4	-19.4	12.5	-34.9	13.6	-23.0	16.0	-27.0	18.5	-31.4	21.3	-36.0	24.2	-41.0	30.6	-51.9	37.8	-64.0
	1	50	10.0	-18.6	10.9	-30.9	11.9	-22.2	13.9	-26.0	16.1	-30.2	18.5	-34.6	21.1	-39.4	26.7	-49.9	32.9	-61.6
	1	100	8.9	-18.1	9.7	-27.8	10.5	-21.5	12.4	-25.2	14.3	-29.3	16.5	-33.6	18.7	-38.2	23.7	-48.4	29.3	-59.8
	2	10	12.5	-34.7	13.7	-56.0	14.9	-41.3	17.5	-48.4	20.3	-56.2	23.3	-64.5	26.5	-73.4	33.6	-92.9	41.5	-114.6
	2	20	11.4	-31.9	12.5	-52.4	13.6	-38.0	16.0	-44.6	18.5	-51.7	21.3	-59.3	24.2	-67.5	30.6	-85.4	37.8	-105.5
	2	50	10.0	-28.2	10.9	-47.6	11.9	-33.6	13.9	-39.4	16.1	-45.7	18.5	-52.5	21.1	-59.7	26.7	-75.6	32.9	-93.3
	2	100	8.9	-25.5	9.7	-44.0	10.5	-30.3	12.4	-35.6	14.3	-41.2	16.5	-47.3	18.7	-53.9	23.7	-68.2	29.3	-84.2
	3	10	12.5	-51.3	13.7	-23.8	14.9	-61.0	17.5	-71.6	20.3	-83.1	23.3	-95.4	26.5	-108.5	33.6	-137.3	41.5	-169.5
	3	20	11.4	-47.9	12.5	-22.6	13.6	-57.1	16.0	-67.0	18.5	-77.7	21.3	-89.2	24.2	-101.4	30.6	-128.4	37.8	-158.5
Roof > 27 to 45 degrees	3	50	10.0	-43.5	10.9	-21.0	11.9	-51.8	13.9	-60.8	16.1	-70.5	18.5	-81.0	21.1	-92.1	26.7	-116.6	32.9	-143.9
	3	100	8.9	-40.2	9.7	-19.8	10.5	-47.9	12.4	-56.2	14.3	-65.1	16.5	-74.8	18.7	-85.1	23.7	-107.7	29.3	-132.9
	1	10	19.9	-21.8	21.8	-27.6	23.7	-25.9	27.8	-30.4	32.3	-35.3	37.0	-40.5	42.1	-46.1	53.3	-58.3	65.9	-72.0
	1	20	19.4	-20.7	21.2	-26.6	23.0	-24.6	27.0	-28.9	31.4	-33.5	36.0	-38.4	41.0	-43.7	51.9	-55.3	64.0	-68.3
	1	50	18.6	-19.2	20.4	-25.0	22.2	-22.8	26.0	-26.8	30.2	-31.1	34.6	-35.7	39.4	-40.6	49.9	-51.4	61.6	-63.4
	1	100	18.1	-18.1	19.8	-23.8	21.5	-21.5	25.2	-25.2	29.3	-29.3	33.6	-33.6	38.2	-38.2	48.4	-48.4	59.8	-59.8
	2	10	19.9	-25.5	21.8	-27.8	23.7	-30.3	27.8	-35.6	32.3	-41.2	37.0	-47.3	42.1	-59.7	53.9	-68.2	65.9	-84.2
	2	20	19.4	-24.3	21.2	-26.6	23.0	-29.0	27.0	-34.0	31.4	-39.4	36.0	-45.3	41.0	-51.5	51.9	-65.2	64.0	-80.5
	2	50	18.6	-22.9	20.4	-25.0	22.2	-27.2	26.0	-32.0	30.2	-37.1	34.6	-42.5	39.4	-48.4	49.9	-61.3	61.6	-75.6
	2	100	18.1	-21.8	19.8	-23.8	21.5	-25.9	25.2	-30.4	29.3	-35.3	33.6	-40.5	38.2	-46.1	48.4	-58.3	59.8	-72.0
Wall	3	10	19.9	-25.5	21.8	-27.8	23.7	-30.3	27.8	-35.6	32.3	-41.2	37.0	-47.3	42.1	-53.9	53.3	-68.2	65.9	-84.2
	3	20	19.4	-24.3	21.2	-26.6	23.0	-29.0	27.0	-34.0	31.4	-39.4	36.0	-45.3	41.0	-51.5	51.9	-65.2	64.0	-80.5
	3	50	18.6	-22.9	20.4	-25.0	22.2	-27.2	26.0	-32.0	30.2	-37.1	34.6	-42.5	39.4	-48.4	49.9	-61.3	61.6	-75.6
	3	100	18.1	-21.8	19.8	-23.6	21.5	-25.9	25.2	-30.4	29.3	-35.3	33.6	-40.5	38.2	-46.1	48.4	-58.3	59.8	-72.0
	4	10	21.8	-23.6	23.8	-25.8	25.9	-28.1	30.4	-33.0	35.3	-38.2	40.5	-43.9	46.1	-50.0	58.3	-63.2	72.0	-78.1
	4	20	20.8	-22.6	22.7	-24.7	24.7	-26.9	29.0	-31.6	33.7	-36.7	38.7	-42.1	44.0	-47.9	55.7	-60.6	68.7	-74.8
	4	50	19.5	-21.3	21.3	-23.3	23.2	-25.4	27.2	-29.8	31.6	-34.6	36.2	-39.7	41.2	-45.1	52.2	-57.1	64.4	-70.6
	4	100	18.5	-20.4	20.2	-22.2	22.0	-24.2	25.9	-28.4	30.0	-33.0	34.4	-37.8	39.2	-43.1	49.6	-54.5	61.2	-67.3
	4	500	16.2	-18.1	17.7	-19.8	19.3	-21.5	22.7	-25.2	26.3	-29.3	30.2	-33.6	34.3	-38.2	43.5	-48.4	53.7	-59.8
	5	10	21.8	-29.1	23.8	-31.9	25.9	-34.7	30.4	-40.7	35.3	-47.2	40.5	-54.2	46.1	-61.7	58.3	-78.0	72.0	-96.3
	5	20	20.8	-27.2	22.7	-29.7	24.7	-32.4	29.0	-38.0	33.7	-44.0	38.7	-50.5	44.0	-57.5	55.7	-72.8	68.7	-89.9
	5	50	19.5	-24.6	21.3	-26.9	23.2	-29.3	27.2	-34.3	31.6	-39.8	36.2	-45.7	41.2	-52.0	52.2	-65.8	64.4	-81.3
	5	100	18.5	-22.6	20.2	-24.7	22.0	-26.9	25.9	-31.6	30.0	-36.7	34.4	-42.1	39.2	-47.9	49.6	-60.6	61.2	-74.8
	5	500	16.2	-18.1	17.7	-19.8	19.3	-21.5	22.7	-25.2	26.3	-29.3	30.2	-33.6	34.3	-38.2	43.5	-48.4	53.7	-59.8

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m<sup>2</sup>, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa

Notes:

a. The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.

b. For effective areas between those given above, the load may be interpolated; otherwise, use the load associated with the lower effective area.

c. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).

d. See Figure R301.2(7) for location of zones.

e. Plus and minus signs signify pressures acting toward and away from the building surfaces.

f. Positive design wind pressures shall not be less than +16 psf and negative design wind pressures shall not be less than -16 psf.

## Slide 7: Interior Wall Coverings:

Interior coverings and finishes must be installed in agreement with tables specified in the code (**Tables R702.1(1), R702.1(2), R702.1(3), & R702.3.5**), which outlines minimum thickness for plaster, gypsum plaster proportions, maximum volume aggregate per volume cementitious material for Portland cement plaster, and minimum thickness for gypsum drywall. (**FBC-Residential R702.1 General.**)

TABLE R702.1(1) THICKNESS OF PLASTER

PLASTER BASE	FINISHED THICKNESS OF PLASTER FROM FACE OF LATH, MASONRY, CONCRETE (inches)	
	Gypsum plaster	Portland cement mortar
Expanded metal lath	5/8, minimum <sup>a</sup>	5/8, minimum <sup>a</sup>
Wire lath	5/8, minimum <sup>a</sup>	3/4, minimum (interior) <sup>b</sup> 7/8, minimum (exterior) <sup>b</sup>
Gypsum lath <sup>g</sup>	1/2, minimum	3/4, minimum (interior) <sup>b</sup>
Masonry walls <sup>c</sup>	1/2, minimum	1/2, minimum
Monolithic concrete walls <sup>c,d</sup>	5/8, maximum	7/8, maximum
Monolithic concrete ceilings <sup>c,d</sup>	3/8, maximum <sup>e</sup>	1/2, maximum
Gypsum veneer base <sup>f,g</sup>	1/16, minimum	3/4, minimum (interior) <sup>b</sup>
Gypsum sheathing <sup>g</sup>	-	3/4, minimum (interior) <sup>b</sup> 7/8, minimum (exterior) <sup>b</sup>

TABLE R702.1(2) GYPSUM PLASTER PROPORTIONS<sup>a</sup>

NUMBER	COAT	PLASTER BASE OR LATH	MAXIMUM VOLUME AGGREGATE PER 100 POUNDS NEAT PLASTER <sup>b</sup> (cubic feet)	
			Damp loose sand <sup>a</sup>	Perlite or vermiculite <sup>c</sup>
Two-coat work	Base coat	Gypsum lath	2.5	2
	Base coat	Masonry	3	3
Three-coat work	First coat	Lath	2 <sup>d</sup>	2
	Second coat	Lath	3 <sup>d</sup>	2 <sup>e</sup>
	First and second coats	Masonry	3	3

TABLE R702.1(3) CEMENT PLASTER PROPORTIONS, PARTS BY VOLUME

COAT	CEMENT PLASTER TYPE	CEMENTITIOUS MATERIALS				VOLUME OF AGGREGATE PER SUM OF SEPARATE VOLUMES OF CEMENTITIOUS MATERIALS <sup>b</sup>
		Portland Cement Type I, II or III or Blended Cement Type IP, I (PM), IS or I (SM)	Plastic Cement	Masonry Cement Type M, S or N	Lime	
First	Portland or blended	1			3/4 - 1 1/2 <sup>a</sup>	2 1/2 - 4
	Masonry				1	2 1/2 - 4
	Plastic		1			2 1/2 - 4
Second	Portland or blended	1			3/4 - 1 1/2	3 - 5
	Masonry			1		3 - 5
	Plastic		1			3 - 5
Finish	Portland or blended	1			3/4 - 2	1 1/2 - 3
	Masonry			1		1 1/2 - 3
	Plastic		1			1 1/2 - 3

TABLE R702.3.5 MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD

THICKNESS OF GYPSUM BOARD (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING <sup>c</sup>
				Nails <sup>a</sup>	Screws <sup>b</sup>	
Application without adhesive						
$\frac{3}{8}$	Ceiling <sup>d</sup>	Perpendicular	16	7	12	13 gage, $1\frac{1}{4}$ " long, $\frac{19}{64}$ " head; 0.098" diameter, $1\frac{1}{4}$ " long, annular-ringed; or 4d cooler nail, 0.080" diameter, $1\frac{3}{8}$ " long, $\frac{7}{32}$ " head.
	Wall	Either direction	16	8	16	
$\frac{1}{2}$	Ceiling	Either direction	16	7	12	13 gage, $1\frac{3}{8}$ " long, $\frac{19}{64}$ " head; 0.098" diameter, $1\frac{1}{4}$ " long, annular-ringed; 5d cooler nail, 0.086" diameter, $1\frac{5}{8}$ " long, $\frac{15}{64}$ " head; or gypsum board nail, 0.086" diameter, $1\frac{5}{8}$ " long, $\frac{9}{32}$ " head.
	Ceiling <sup>d</sup>	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
Application with adhesive						
$\frac{3}{8}$	Ceiling <sup>d</sup>	Perpendicular	16	16	16	Same as above for $\frac{3}{8}$ " gypsum board
	Wall	Either direction	16	16	24	
$\frac{1}{2}$ or $\frac{5}{8}$	Ceiling	Either direction	16	16	16	
	Ceiling <sup>d</sup>	Perpendicular	24	12	16	Same as above for $\frac{1}{2}$ " and $\frac{5}{8}$ " gypsum board,
	Wall	Either direction	24	16	24	respectively
Two $\frac{3}{8}$ layers	Ceiling	Perpendicular	16	16	16	Base ply nailed as above for $\frac{1}{2}$ " gypsum board;
	Wall	Either direction	24	24	24	face ply installed with adhesive

Interior finishes and materials must comply with the flame spread and smoke-development requirements of Section R302.9, which states that wall and ceiling finishes shall have a flame-spread classification of no greater than 200 and a smoke-developed index of no greater than 450. (**FBC- Residential R702.1 General and R302.9.1 Flame spread index and R302.9.2 Smoke-developed index.**)

### **Slide 8: Minimum Room Dimensions:**

The total area of a residence is generally not regulated by code; however a structure more than three stories in height would have to meet the provisions of the Florida Building Code- Building, rather than Residential Code. Only homes three stories or less, with a separate means of egress for accessory structures (like a garage or carport) fall under the provisions of the Residential Code. (**FBC- Residential R101.2 Scope.**) The Code does, however, have several minimum requirements that apply to residences. Residential space standards provide specifications for the internal floor area of dwellings and rooms.

Every dwelling must have at least one habitable room that has a minimum of 120 square feet of gross floor area. (**FBC- Residential R304.1 Minimum area.**) In most cases, this larger room is designed as the living area in a home. Other habitable rooms must have a floor area of at least 70 square feet (**FBC- Residential R304.2 Other rooms.**) and cannot have any one wall less than 7 feet in length. (**FBC- Residential R304.3 Minimum dimensions.**)

The kitchen, however, though still considered a habitable room, can be a little smaller, but not less than 50 square feet in gross floor area. (**FBC- Building 1208.3 Room area (Exception.)**) A habitable room is defined as all rooms used for living, dining, sleeping and cooking purposes. Bathrooms, closets, halls, and utility spaces are not considered habitable rooms. (**FBC-Building 202 Definitions.**)

It's important to keep in mind, that when figuring the square footage of a room, any portions of the room with a sloped ceiling measuring less than 5 feet or a furred ceiling measuring less than 7 feet from the finished floor to the finished ceiling are not included as habitable space for the room. (**FBC- Residential R304.4 Height effect on room area.**)

The home designer has the flexibility to distribute the total amount of space among the rooms as they wish, as long as the combined spaces and the individual rooms meet minimum code requirements.

#### **Slide 9: Ceiling Heights & Insulation:**

Habitable space, hallways, bathrooms, toilet rooms, laundry rooms, and portions of basements containing these spaces cannot have a ceiling less than 7 feet. (**FBC- Residential R305.1 Minimum height.**)

If you've ever read any Florida Building Code before, you won't be surprised to hear that there are some exceptions to that provision:

1. Rooms with sloped ceilings need to have a ceiling height of at least 7 feet in no less than 50% of the required floor area of the room, and no portion of the required floor area can have a ceiling height of less than 5 feet.
2. The ceiling in a bathroom must be at least 6 feet 8 inches over bathroom fixtures as well as at the center of the clearance area in front of the fixtures, which ranges from 21" to 24" depending on the fixture type. In a shower or tub area with a showerhead, there are minimum space requirements, which include a 30 inch x 30 inch area at the showerhead and a ceiling height of no less than 6 feet 8 inches. (**FBC- Residential R305.1 Minimum height (Exceptions.)**)

The code further specifies that ceilings in basements without habitable space, hallways, bathrooms, toilet rooms and laundry rooms can be as low as 6 feet 8 inches in height, and beams, ducts, or other obstructions may project to within 6 feet 4 inches of the finished floor. (**R305.1.1 Basements.**)

Often people renovate an attic to increase their home's resale value but spaces with a ceiling height of less than 7 feet don't contribute to a home's square footage in terms of appraisal.

Insulation materials must have a flame spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84 or UL 723. (**FBC- Residential R302.10.1 Insulation.**)

#### **Slide 10: Garages:**

The relationship between the garage and the habitable spaces of the home, require special attention and detailing. In order to prevent carbon monoxide or fumes from other hazardous materials stored in the garage from entering the house, openings from the garage leading directly into a bedroom space are not permitted by the Florida Building Code.

Other openings between the garage and residence shall be equipped with either a solid wood door, solid, or honeycomb core steel door, none of which can be less than 1 3/8" thick, or you can use a 20-minute fire-rated door. (**FBC- Residential R302.5.1 Opening protection.**) The garage must be separated from the home interior and attic area by a minimum of ½" thick gypsum board applied to the garage side.

Garages situated beneath habitable rooms require a separation of at least 5/8" Type X gypsum board or equivalent. (**FBC- Residential Table R302.6 Dwelling/Garage Separation.**)

#### **What's the difference between regular gypsum wallboard and Type X gypsum?**

ASTM C 36 designates two types of gypsum wallboard, regular and type X. Type X wallboard is formulated by adding noncombustible fibers to the gypsum. These fibers help maintain the integrity of the core as shrinkage occurs, providing greater resistance to heat transfer during fire exposure. Type X gypsum is typically required to achieve required fire resistance ratings.  
[<http://www.nationalgypsum.com/resources/faqs/gypboard.aspx>]

#### **Slide 11: Detached Garages and Carports:**

Detached Garages on the same lot as a house but located less than 3 feet away from it, require at least ½" gypsum board applied to the interior side of exterior wall that faces the home, this extra protection is not required on the garage walls perpendicular to the house. (**FBC- Residential Table R302.6 Dwelling/Garage Separation.**)

There should be no opening for air duct systems into the garage, such as returns or vents. These might actually "fuel" a fire. Any ducts passing through the garage or penetrating the separating wall or ceiling are required to be a minimum of 26-gauge sheet steel, 1 inch minimum rigid nonmetallic Class 0 or Class 1 duct board, or other approved material. (**FBC- Residential R302.5.2 Duct penetration.**)

Garage floors are required to be of an approved noncombustible material, and should be sloped to facilitate the movement of liquids either to a drain or toward the main vehicle entry. (**FBC- Residential R309.1 Floor surface.**)

Carports need to be open on at least two sides, and have approved noncombustible floor material. Ground level carports can have asphalt surfaces. Please note, if a carport is not open on at least two sides, it's considered to be a garage according to code, and must meet the minimum provisions for garages. ([FBC- Residential R309.2 Carports.](#))

**Slide 12: Section Complete:**

That completes our discussion of Structural Loads and Spaces. Let's play a short game to reinforce the material we just covered. Don't worry it'll be fun. When you're finished you can move on to **Section 3- Means of Egress and Emergency Openings!**

**Slide 13:**

**Learning Exercise 2**

**SECTION 3 Means of Egress and Emergency Openings:**

**Slide 1:** Advanced Code Requirements for Residential Construction

**Slide 2:** Welcome to **Section 3** of Advanced Code for Residential Construction, **Means of Egress and Emergency Openings!**

**Slide 3:** In this portion of the course we'll review:

- Important definitions for understanding the means of egress system,
- discuss glazing systems requirements for various spaces,
- we'll break down the building elements important to a means of egress system, including stairs, ramps & landings,
- and outline important requirements for smoke alarm systems.

**Slide 4: Means of Egress:**

The Florida Building Code defines "means of egress" as a travel system that provides a continuous, unobstructed and undiminished path from an occupied point in a building or structure to a public way. ([FBC-Building 1002.1 Definitions.](#))

A means of egress is required by the building code to provide a point of emergency escape and rescue. The term "egress" is used in most building codes to specify areas of access or exits, typically doors, windows, and hallways. The phrase "means of egress" refers to the ability to exit the structure, primarily in the event of an emergency, such as a fire.

A means of egress comprised of three distinct parts: the path of travel to an exit, the exit itself, and the exit discharge (the path to a safe area outside). ([FBC-Building 1002.1 Definitions.](#))

Here are these terms defined, as well as some other important definitions for understanding the means of egress system.

#### **Slide 5: Means of Egress: Important Terms**

**1. EXIT ACCESS:** The portion of a means of egress system that leads you from occupied space to an exit. It includes any room or space occupied by a person and any doorway, aisle, corridor, stair, or ramp traveled on the way to the exit. ([FBC-Building 1002.1 Definitions.](#))

**2. EXIT:** The portion of a means of egress system that is between the exit access and the exit discharge or public way. This area is separated from other interior spaces by fire-resistance-rated construction and opening protectives as required. It can be very basic, such as an exterior door, or it can include enclosed stairwells and ramps. In some special cases, it can include exit corridors or passageways. The building materials used for an exit require higher fire ratings than the materials for exit access. ([FBC-Building 1002.1 Definitions.](#))

**3. EXIT DISCHARGE:** The portion of a means of egress system between the termination of an exit and the public way. ([FBC-Building 1002.1 Definitions.](#)) It can be inside a building such as the main lobby, or outside a building such as an exterior vestibule, courtyard, patio, small alley, or other safe passageway.

**PUBLIC WAY:** An area exposed to open air that leads to a street permanently appropriated for the public and public use. This area can be a street, alley or other land parcel, but by definition has a minimal clear width and height of 10'. ([FBC-Building 1002.1 Definitions](#) and [FBC Residential R202 Definitions.](#)) What distinguishes a public way from an exit discharge is its size. For example, any alley can be an exit discharge, but if it is 10 feet wide and 10 feet high and it leads to a public street, it is a public way.

#### **Slide 6: Exit Doors:**

The number of exits required for a structure is based on its intended use and occupancy. Because the normal number of occupants in a residence is less than in a similarly-sized non-residential space, determining a safe level of means of egress is not as complicated.

The Building Code requires all dwellings to have at least one egress door that has direct access from a continuous unobstructed path of travel from all portions of the dwelling to the exterior, without requiring travel through a garage. ([FBC-Residential R311.1 Means of egress.](#))

The required exit door must be side-hinged and cannot be less than 32" wide by 6' 6" high. Other doors to the exterior are allowed to have smaller widths. ([FBC-Residential R311.2 Egress door.](#))

Each exterior door is required to have a floor or landing on each side of the door except when a stairway with two or fewer risers is located on the exterior side of the door. (FBC-Residential R311.3 **Landings at doors & (Exception).**)

The width of the landing should not be less than the width of the door and should have a minimum dimension of 36 inches measured in the direction of travel. (FBC-Residential R311.3 **Landings at doors.**)

#### **Slide 7: Emergency Exits:**

Basements and each sleeping room need to have at least one operable emergency escape and rescue opening with a minimum clear opening of 5.7 square feet, which opens directly into a public street, public alley, yard, or court. (FBC-Residential R310.1 **Emergency escape and rescue required** and R310.1.1 **Minimum opening area.**)

Emergency escape openings can have a minimum net clear opening height of 24 inches or a minimum width of 20 inches (FBC-Residential R310.1.2 **Minimum opening height** and R310.1.3 **Minimum opening width.**), and must have sill height within 44 inches of the floor. (FBC-Residential R310.1 **Emergency escape and rescue required.**)

Emergency escape openings must be operable from the inside of the room without the use of keys or tools or special knowledge. (FBC-Residential R310.1.4 **Operational constraints.**) This gives occupants in each sleeping area a method of escape in case of a fire.

#### **Slide 8: Windows and Glazing:**

The light and ventilation requirements of the building code have a major effect on window type, size and placement. Window glass, called glazing, has come a long way since the days when windows had only a single pane of glass. Today's energy-efficient windows come with glazing "systems" that incorporate multiple panes of glass, gas fillings, and high-tech, heat-sensitive coatings. These new and improved windows may cost more but they pay off in increased comfort and reduced energy costs.

#### **Slide 9: Window Glazing- Ratings:**

Window glazing is rated on three criteria: how well it insulates, how much light it lets through, and how effectively it blocks heat from the sun. By taking these values into consideration, you can effectively choose the best windows for the climatic conditions of the property, and even tailor individual windows to best suit specific rooms in the house.

#### **Slide 10: Window Glazing- Hazardous Locations:**

The Building Code requires each pane of glass to bear the manufacturer's label, indicating the type and thickness of glass or glazing material. This safety glazing label has to be acid etched,

sandblasted, ceramic-fired, embossed mark, or once applied unable to be removed without being destroyed. ([FBC-Residential R308.1 Identification.](#))

Some of the areas that incorporate glazing are considered hazardous by the building code and require special attention or detailing.

The following are considered hazardous locations for glazing:

- 1) glazing in swinging doors and storm doors.
- 2) glazing in sliding and bifold closet doors.
- 3) glazing in unframed swinging doors.
- 4) glazing in doors, enclosures, walls and fences enclosing hot tubs, saunas, bathtubs, and showers.
- 5) glazing in an individual fixed or operable panel next to a door where the nearest vertical edge is within 24 inch arc of the door and the bottom edge is less than 60 inches above any walking surface.
- 6) glazing in railings.
- 7) glazing next to stairways, landings and ramps within 36 inches of walking surface .

([FBC-Residential R308.4 Hazardous Locations.](#))

### **Slide 11: Window Glazing- Habitable Rooms:**

The FBC states that all livable rooms need to have a combined glazing area of not less than 8 percent of the floor area of that room. Natural ventilation should be provided through windows, doors, louvers, or other approved openings to the outside air. These openings need to be readily accessible and controllable by the building occupants. The minimum openable area to the outdoors should be 4 percent of the floor area being ventilated. ([FBC-Residential R303.1 Habitable Rooms.](#))

Naturally there are a few exceptions.

1. The windows do not need to be openable as long as it's not required by Section R310 and if an approved mechanical ventilation system that produces 0.35 air change per hour is installed in the room or if a mechanical ventilation system is installed in the whole house and it is capable of supplying outdoor air of up to 15 cubic feet per minute per occupant. Occupancy figures are computed based on the number of bedrooms in the house.

2. Glazed areas don't need to be installed in rooms that satisfy Exception 1 and artificial light in the room is capable of producing an average illumination of 6 foot-candles over the area of the room at a height of 30 inches above the floor. ([FBC-Residential R303.1 Habitable Rooms.](#))

Just to give you some concept of the brightness required, a brighter than typical light for use in a bathroom or hallway is about 7 ½ to 8 foot-candles, and the light needed for a TV studio is about 92 foot-candles. Direct sunlight can range from 3000 to 12000 foot-candles.

3. It is permissible for a sunroom or patio cover to be used as natural ventilation as long as 40 percent of the exterior sunroom walls are open, or are enclosed by insect screening. (**FBC-Residential R303.1 Habitable Rooms.**)

#### **Slide 12: Window Glazing- Bathrooms:**

Bathrooms have different requirements: There should not be less than 3 square feet of combined glazing area in windows in bathrooms, water closets and similar rooms, half of which is readily controllable.

You can avoid this requirement by providing artificial light and a mechanical ventilation system. The minimum ventilation rates are 50 cubic feet per minute for intermittent ventilation or 20 CFM for continuous ventilation (which is a constant and controlled level of ventilation). Don't forget ventilated air must always be exhausted directly to the outside. (**FBC-Residential R303.3 Bathrooms.**)

#### **Slide 13: Window Glazing- Opening Details:**

Required glazed openings need to open directly onto a street, public alley, yard, or court located on the same lot as the building. (**FBC-Residential R303.7 Required Glazed Openings.**)

They can open onto a roofed porch as long as the longer side of the porch is at least 65 percent open and unobstructed and there's a ceiling height of not less than 7 feet. (**FBC-Residential R303.7 Required Glazed Openings (Exception).**)

Windows are permitted to open into sunroom additions or patio covers that look onto a street, yard or court as long as more than 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening and if the ceiling height is not less than 7 feet. (**FBC-Residential R303.7.1 Sunroom additions.**)

The alternative to providing openable windows is to provide **mechanical ventilation**. We will discuss mechanical heating and cooling in more depth in Section 4 of this course.

#### **Slide 14: Exit Access- Stairways:**

Stairs can often dictate the layout of an entire structure. Because of their importance in the design process, stairs must be considered early on. The location of railings and balusters, the width and depth of treads, and the height of risers can all affect a stairway's ease and safety of use, both in terms of everyday use and as part of a means of egress system. Therefore, these dimensions are regulated by most building codes.

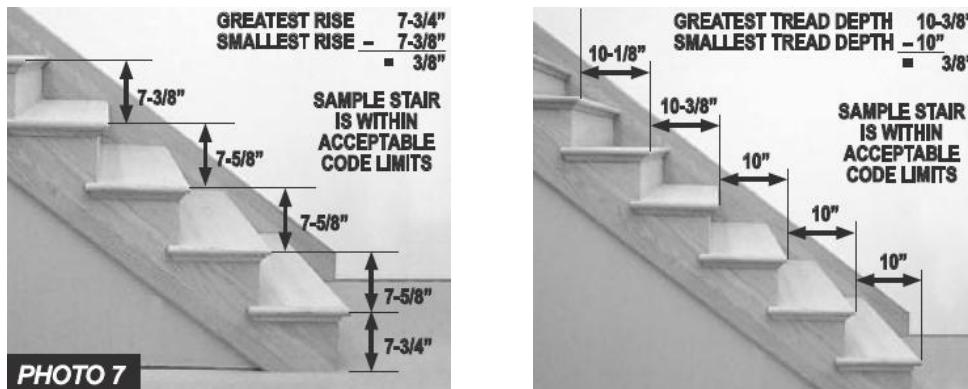
The Florida Building Code requires that exterior landings, decks, balconies, stairs and similar facilities, must be positively anchored to the primary structure to resist vertical and lateral

forces or shall be designed to be self-supporting. Attachment cannot be completed with nails, such as toenails, that are subject to withdrawal. ([FBC-Residential R311.5.1 Attachment.](#))

### **Slide 15: Treads, Risers & Landings:**

The maximum height of a stair riser is 7  $\frac{3}{4}$  inches. Within any flight of stairs, the actual measurement cannot be more than 3/8" difference between the greatest riser height and the smallest. ([FBC-Residential R311.7.4.1 Riser height.](#))

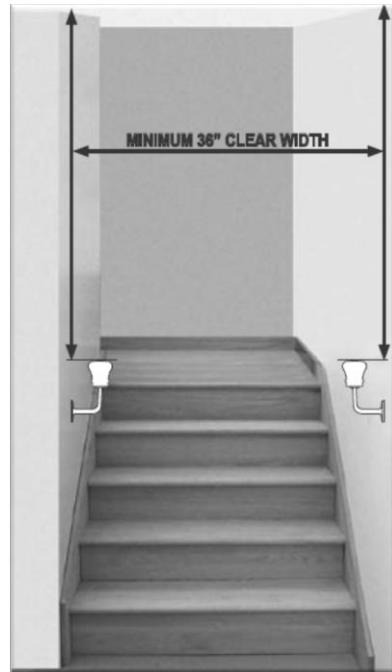
The minimum tread depth cannot be less than 10 inches. As with the stair risers, to achieve uniformity of motion, the actual measurement of the tread depth cannot be more than 3/8" difference between the greatest depth and the smallest. ([FBC-Residential R311.7.4.2 Tread depth.](#))



Headroom must also be considered. In all parts of the stairway the minimum headroom is 6 feet 8 inches. This is measured vertically from the sloped plane created by adjoining tread nosings as well as from the finished floor of the landing or platform. ([FBC-Residential R311.7.2 Headroom.](#))

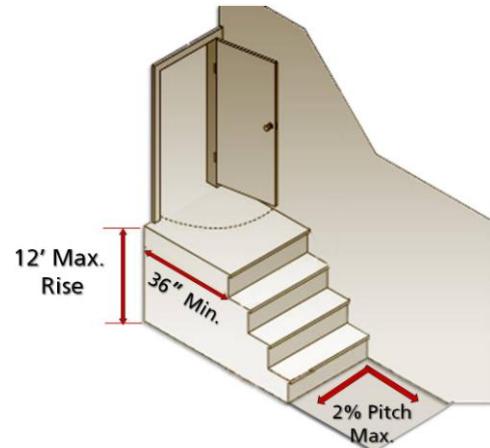


Allowing for this required headroom influences wall placement on an upper floor over the stairwell. Stairways can't have less than 36 inches clear width between the height of the handrail and the headroom. ([FBC-Residential R311.7.1 Width.](#))



You have to provide landings at the top and bottom of each stairway. No vertical rise of more than 12' is allowed between floor levels or landings. Additionally, the width of the landing can't be smaller than the stairway it connects to, and every landing needs a minimum dimension of 36 inches measured in the direction of travel. ([FBC- Residential R311.7.5 Landings for stairways.](#))

The pitch of treads and landings cannot exceed 2%. ([FBC- Residential R311.7.6 Stairway walking surface.](#))



### Slide 16: Stairway lighting:

Lighting is an important element in stairway design. It does not need to be especially bright, but the risers and treads should have sufficient light to ensure that they can be distinguished. All interior and exterior stairways, including landings and treads, must be provided with a means of illumination.

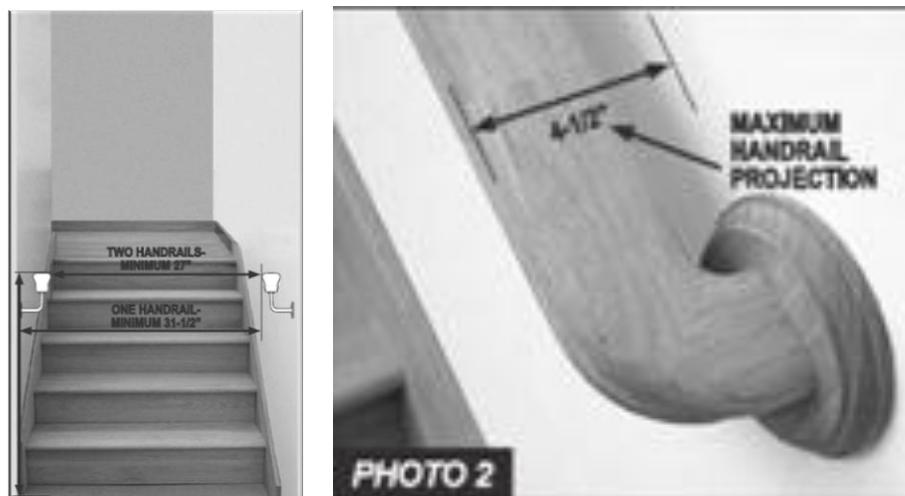
Interior stairways must include an artificial light source located in the immediate vicinity of each landing, capable of illuminating the steps a minimum of 1 foot-candle. Exterior stairways need an artificial light source located at the top landing. (**FBC- Residential R303.6 Stairway illumination.**)

Interior stairways with 6 or more risers need to include a light switch on the wall at both the top and bottom of the stairs. Exterior stairways need a light switch that can be controlled from inside the house. However, if the stairway lighting is continuously illuminated or automatically controlled, these switch requirements are not necessary. (**FBC- Residential R303.6.1 Light activation & Exception.**)

### Slide 17: Handrail Requirements:

Guards and handrails are needed by a variety of people for very different purposes. For example, they protect people from falling off the edge of the stair tread or landing but also help people keep their balance and provide leverage when ascending/descending stairs.

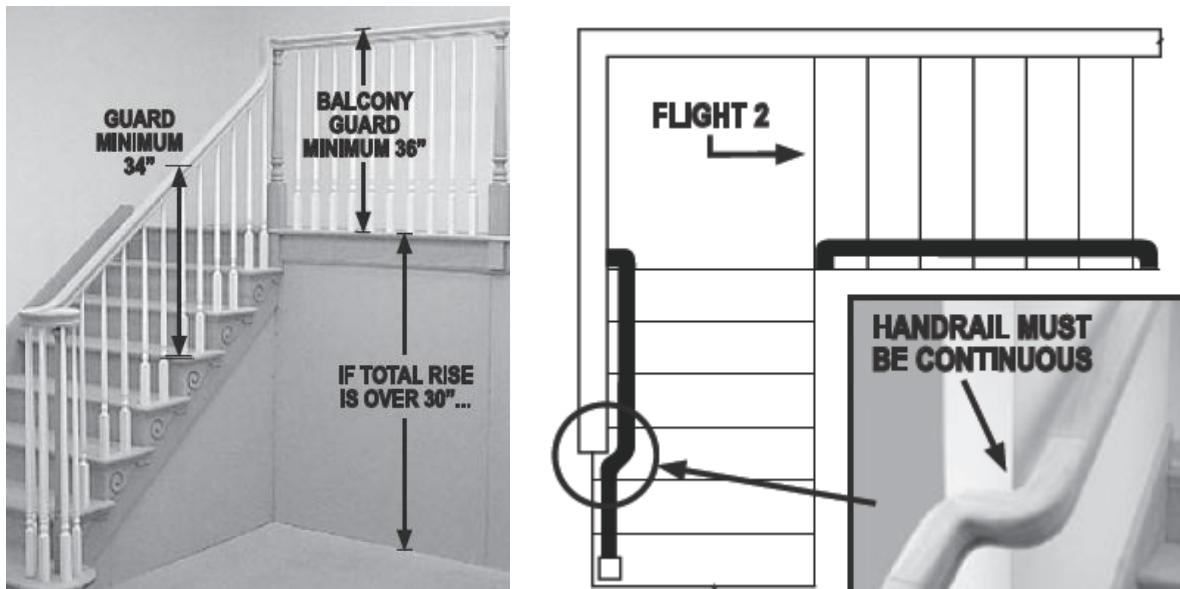
The maximum projection of the handrails off the wall is 4.5" on either side of the stairway. The space between the wall and the inner edge of the handrail can't be less than 1- ½". For a stairway with a handrail on only one side there must be a minimum clear width of 31.5 inches at the height of and below the handrail projection. For a stairway with handrails on both sides, this clear width can't be less than 27". (**FBC-Residential R311.7.1 Width and R311.7.7.2 Continuity.**)



Any stairway with 4 or more risers has to have a handrail on at least one side. ([FBC-Residential R311.7.7 Handrails.](#)) The height of which should be between 34 and 38" from the sloped plane created by adjoining adjacent nosings. ([FBC-Residential R311.7.7.1 Height.](#))

Handrails should be continuous for the full length of the flight and the ends should be either returned or terminated in newel posts or safety terminals. ([FBC-Residential R311.7.7.2 Continuity.](#))

The outside diameter of circular-shaped handrails must be between 1  $\frac{1}{4}$ " and 2 inches. Handrails with a non-circular cross section need a perimeter dimension of 4 to 6  $\frac{1}{4}$  inches. ([FBC-Residential R311.7.7.3 Grip-size.](#))



### Slide 18: Ramps & Guards:

A ramp is an inclined plane that functions with or instead of stairs. Ramps permit wheelchair users, as well as people pushing strollers, carts, or other wheeled objects, to more traverse an elevation change.

The maximum slope of a ramp is 8.3 percent slope. ([FBC-Residential R311.8.1 Maximum slope.](#)) A 3' by 3' landing is required at the top and bottom of the ramp, where ramps change directions, and where a door opens onto a ramp. ([FBC-Residential R311.8.2 Landings required.](#))

Guards are building components located at the open side of an elevated walking surface, its purpose is to minimize the possibility of a fall to the lower level. ([FBC- Building 1002.1 Definitions.](#))

Porches, balconies, ramps, or raised floor surfaces that are 30 inches or more above the floor below require 36" minimum guards. Stairways that rise 30" or more above the floor below must have 34" minimum guards on the open side of the stair. Screened porches, sunrooms and decks 30" above the ground or floor elevation also required guards. (**FBC- Residential R312.1 Guards-where required.**)

Where guards are required they should be equipped with intermittent rails or ornamental closures which do not allow passage of a sphere 4 inches or more in diameter. (**FBC- Residential R312.3 Opening Limitations.**)



### Slide 19: Smoke Alarms

A means of egress system is designed to provide safe and continuous passage of emergency escape out of a structure and into public space. In addition to this travel corridor in an emergency situation there are other building components which contribute to safe escape. Such items include effective lighting, properly placed exit signs, and operable smoke alarms. Of course for residential design the latter is of the upmost importance.

According to the Residential Florida Building Code, smoke alarms should be installed in each bedroom, outside each separate sleeping area in the immediate vicinity of the bedrooms, and on each additional story of the dwelling, including basements but not including crawl spaces and uninhabitable attics.

If the dwelling is split level without an intervening door between adjacent levels, a smoke alarm on the upper level will suffice for the adjacent lower level, as long as its less than a full story difference. (**FBC- Residential R314.3 Location.**) To prevent false alarms, when locating fire alarms, be sure to avoid close proximity to the kitchen or fireplace.

All smoke alarms need to be listed in accordance with UL 217, a standard for electrically operated single and double station fire alarms intended for residential applications. Smoke alarms should be installed in accordance with the household fire warning equipment provisions of the National Fire Protection Association, NFPA 72. (**FBC- Residential R314.1 Smoke detection and notification.**)

Additionally, smoke alarms must be installed so as to receive primary power from the building's electrical wiring, but should also contain a battery-powered back up system; and if more than one alarm is required they should be interconnected so that if one alarm activates, all the alarms in the dwelling unit will sound. (**FBC-Residential R 314.3 Location and R314.4 Power source.**)

### **Slide 20: Section Complete**

Now that we've discussed the elements of a means of egress system and the building components that help create that system, let's have a quick learning exercise, so you can gauge your understanding of the material. You know the drill, have fun & good luck.

### **Slide 21:** **Learning Exercise 3**

## **SECTION 4- PLUMBING & MECHANICAL**

### **Slide 1: Advanced Code Requirements for Residential Construction.**

### **Slide 2: Section 4- Plumbing & Mechanical**

Welcome to **Section 4** of Advanced Code Requirements for Residential Construction- **Plumbing & Mechanical**.

### **Slide 3: Section Preview**

In this portion of the course, we'll be reviewing:

- the minimum plumbing requirements for providing a sanitary living space,
- the importance, proper performance and placement of mechanical ventilation including bathroom, kitchen & laundry exhaust and specifications for fuel-fire appliances,
- we'll also discuss the requirement for providing protection against termites and the role that code requirements play in the health, safety & welfare of the populous.

### **Slide 4: Sanitation**

For sanitation purposes, the minimum plumbing requirements for a residence includes providing a kitchen sink, toilet, lavatory and a bathtub or shower. (**FBC- Residential R306.1 Toilet facilities & R306.2 Kitchen.**)

All plumbing fixtures need to be connected to an approved water supply and a sanitary sewer or an approved private sewage disposal system. (**FBC- Residential R306.4 Water supply to fixtures & R306.4 Water supply to fixtures.**) Additionally, bathroom, kitchen and laundry outlets must be supplied with hot and cold water. (**FBC- Residential R306.4 Water supply to fixtures.**)

Hot water shall be supplied by an approved automatic water heater or other type of domestic water-heating system sufficient to supply hot water to fixtures and appliances in spaces intended for bathing, washing or cooking. (**FBC- Residential P2801.1 Required.**)

Storage tanks for hot water heaters must be constructed of or lined with noncorrosive metal. (**FBC- Residential P2801.1 Required.**) And need to be connected and located where they can be maintained, serviced, and replaced. (**FBC- Residential P2801.3 Location.**)

Ideally, hot water heaters should be installed in a room with a floor drain, and should be equipped with a shut-off valve, to minimize damage in the event of a leak.

#### **Slide 5: Bathrooms Requirements:**

All bathroom fixtures shall be spaced according to this Figure. [**Figure R307.1 Minimum Fixture Clearances.**]

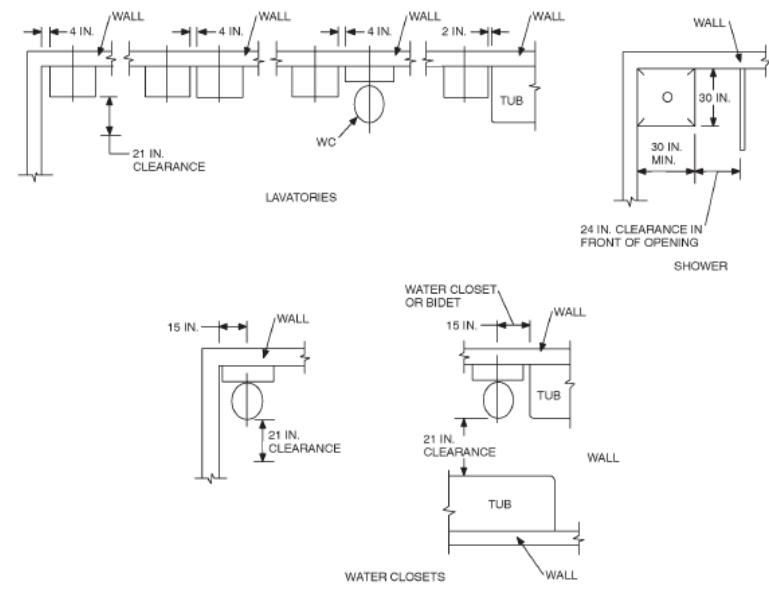


FIGURE R307.1  
MINIMUM FIXTURE CLEARANCES

Let's highlight some important dimensions:

- The centerline of the toilet or bidet must be at least 15" from a wall or other obstruction, and needs 21" of forward clearance.
- Sinks are shown in 4 different configurations- in all cases the sink should be 4" off the wall and have 21" of forward clearance. Double sinks should be separated by a minimum space of 4". A sink next to a toilet also needs 4" separation space, but a sink next to a tub needs only 2" of separation.
- The minimum dimensions allowed for a shower is 30" x 30" (that's 900 square inches), and there should be a minimum of 24" forward clearance at all shower entrances.

(FBC- Residential R307.1 **Space required.**)

Plumbing fixtures, faucets, and fittings must have smooth impervious surfaces, free of defects, and constructed of approved materials. Fixtures must be provided with a supply of potable water adequate to flush the fixture and maintain a clean and sanitary condition, without danger of backflow or cross connection. (FBC- Residential P2701.1 **Quality of fixtures.**)

#### **Slide 6: Shower Specifications:**

In addition to the minimum area of interior space required for showers by Figure R307.1, there must also be 70" of minimum height provided above the shower drain. (FBC- Residential P2708.1 **General.**)

Shower openings must have a clear and unobstructed finished width of not less than 22", and hinged shower doors, if used, must open outward. (FBC- Residential P2708.1 **General & P2708.1.1 Access.**)

Shower valves and shower/tub combination valves must be equipped with pressure-balance controls, thermostatic mixing, or a combination of the two. They must also include a high limit stop, set to limit the water temperature to 120 degrees maximum. (FBC- Residential P2708.3 **Shower control valves.**)

Walls and floors in shower and tub spaces must be of a nonabsorbent surface material that extends at least 6 feet above the floor. (FBC- Residential R307.2 **Bathtub and shower spaces.**) Such material cannot be water-resistant gypsum board. Although water-resistant gypsum board is permitted for use as a backer for tiles or wall panels in showers and tubs, it cannot be installed over the vapor retarder, as this would create a waterproof membrane on both sides of the gypsum board, trapping moisture and ultimately causing it to fail. Ideally, gypsum board should not be used in wet areas. (FBC- Residential R702.3.8 **Water-resistant gypsum backing board & R702.3.8.1 Limitations.**)

#### **Slide 7: Mechanical Ventilation Systems:**

Okay, switching gears now, let's discuss the benefits mechanical ventilation and related specifications. Mechanical ventilation systems circulate fresh air using ducts and fans. Ventilation systems significantly improve a home's air quality by removing allergens, pollutants and moisture that can cause mold problems. They can provide proper fresh air flow with appropriate locations for intake and exhaust and can also provide filtration, dehumidification and conditioning of the outside air as it enters. Without ventilation moisture, odors, and other pollutants can build up inside a home.

### **Slide 8: Venting:**

Ducts are used in heating, ventilation, and air conditioning systems, to deliver and remove air. Air ducts are one method of ensuring acceptable indoor air quality, as well as, thermal comfort.

Outside air intake openings cannot be located within 10 feet of vents, chimneys, plumbing vents, streets, alleys, parking lots, or loading docks, as these are considered sources of hazardous or noxious contaminants. Exhaust from bathrooms and kitchens are not considered noxious or hazardous.

If a source of contaminant *is* located within 10 feet of intake openings the opening needs to be located at least 2 feet below the contaminant source. (**FBC- Residential R303.4.1 Intake openings.**) This will help prevent contaminants from being introduced into the ventilation system or exhaust from entering into occupied areas or into other buildings.

Exhaust openings located outdoors must not be directed on to walkways or create a nuisance by its location. (**FBC- Residential R303.4.2 Exhaust openings.**) Additionally, exhaust and intake openings that terminate outdoors should be protected from the weather with corrosion-resistant screens, louvers, or grilles with openings  $\frac{1}{4}$ " to  $\frac{1}{2}$ " in any dimension. (**FBC- Residential R303.5 Outside opening protection.**)

### **Slide 9: Bathroom Exhaust:**

Exhaust air from bathrooms and toilet rooms should not be recirculated within a residence or to another dwelling unit, but should instead be exhausted directly to the outdoors. (**FBC- Residential M1507.2 Recirculation of air.**) This prevents the flow of contaminants from one unit to another.

Bathroom fans should not be vented into an attic or crawl space because it can cause moisture build-up, discoloration, and rot in the rafters. The humidity can damage the structure and insulation.

**Exhaust fans should be located in or near the shower or tub, and in an enclosed water closet. Keep exhaust points opposite the supply air source to ensure that the fresh air is drawn through the room.**

Bathroom doors should not be sealed too tightly at the bottom in order to allow “makeup air” to enter the room when the door is closed.

Ventilation fans in bathrooms should have the capacity to exhaust a minimum of 50 cubic feet per minute intermittently or 20 cubic feet per minute continuously. (**FBC- Residential M1507.3 Ventilation rate.**)

#### **Slide 10: Laundry Exhaust:**

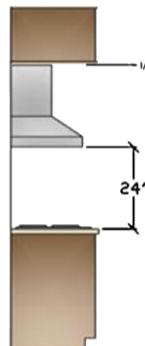
Clothes dryers emit high levels of moisture, which could lead to mold growth and building deterioration if vented to the indoors. Therefore, clothes dryers must be exhausted in accordance with the manufacturer’s instructions, be independent of all other systems, and convey any moisture and combustion products to the outside. (**FBC- Residential M1502.1 General & G2439.1 Installation.**)

The exhaust should be terminated to the outside in accordance with the manufacturer’s installation instructions. In the absence of installation instructions, the exhaust duct cannot terminate less than 3 feet in any direction from openings into house. Screens should not be installed at the duct termination, but should instead be equipped with a backdraft damper, which is a damper with blades actuated by gravity, permitting air to pass through them in one direction only. (**FBC- Residential M1502.3 Duct termination.**)

#### **Slide 11: Kitchen specifications:**

According to the Florida Building Code, a range hood is not required in a kitchen, unless an open-top broiler is installed.

Domestic open-top broiler units must include a 28 gage metal exhaust hood. It should be installed with  $\frac{1}{4}$  inch between the hood and the underside of combustible materials or cabinets. The cooking surface of the broiler unit needs a clearance of at least 24” from combustible materials or cabinets. The exhaust hood needs to be at least as wide as the broiler unit and extend over the entire unit. Additionally, it must exhaust to the outside and have a backdraft damper or other means to control infiltration and exfiltration when not in use. (**FBC- Residential M1505.1 General.**)



The ventilation rate required for kitchen exhaust is 100 cubic feet per minute intermittently or 25 cubic feet per minute continuously. (**FBC- Residential M1507.3 Ventilation rate.**)

All household cooking appliances must be listed, labeled and installed in accordance with the manufacturer's installation instructions. (**FBC- Residential M1901.2 Cooking appliances.**)

#### **Slide 12: Fuel-fired appliances:**

Gas-fired appliances such as stoves, ranges, heaters and lamps require special consideration. A supply of air for fuel combustion and ventilation of the space in which the appliance is installed must be provided. (**FBC- Residential G2407.1 General.**) Failure to supply adequate air can result in improper draft, soot production, increased carbon monoxide production, and risk of fire or explosion; failure to vent properly can cause build-up of carbon monoxide, high temperatures, and increased risk of fire.

Fuel-fired appliances may not be located in bedrooms, bathrooms, or storage closets. They can however, be located in spaces that can only be accessed from and open into such rooms, but only if all combustion air is obtained from the outdoors through permanent openings with a solid weatherstripped door and self-closing device. (**FBC- Residential G2406.2 Prohibited locations.**) This is to avoid build-up of combustion gases, or the depletion of oxygen levels. Asphyxiation can result from inadequate combustion air.

#### **Slide 13: Protection against Termites:**

Before March 1<sup>st</sup>, 2002, there was no standard control for protection against termites, and building codes did not require contractors or pest control operators to prevent termite infestations. As a result termite damage was at record levels. The effect of implementing requirements as per the Florida Building Code is now making builders more responsible for termite protection.

The Florida Residential Code states that termite protection must be provided by registered termiticides, including soil applied pesticides, baiting systems and pesticides applied to wood, or other approved methods of termite protection labeled for use as a preventative treatment to new construction.

A Certificate of Compliance will be issued by the licensed pest control company to the building department upon completion of the application of the termite protective treatment. It will state that the building has received complete treatment for the prevention of subterranean termites in accordance with the Florida Department of Agriculture and Consumer Services. (**FBC- Residential R318.1 Termite Protection.**)

#### **Slide 14: Professional Standards:**

The importance of the Residential Building Code is to protect the integrity of the dwelling and ensure the health, safety, and welfare of the occupant(s). Codes are an essential part of designing building interiors. Contractors, architects, interior designers and engineers refer to the code when designing or constructing a home in order to adhere to the law. In this class, we have provided the minimum requirements for some specific areas so that these design professionals can be aware of what the basic guidelines are.

**Slide 15:**  
**Course Complete**

To view a live demo of this course go to: [www.on-line-classes.com/wm\\_10.php](http://www.on-line-classes.com/wm_10.php)