



BUILDING CODES

Course Handout

Course Overview

NOTE: This course is based on 2011 Oregon Residential Specialty Code (ORSC)

1. Building Code History and Origin (30 min)
2. Working Effectively with Code Officials (11 min)
3. Ten Common Code Errors or Omissions (22 min)
4. Code Changes and How They Affect Your Work (40 min)
5. Legislative Code Changes (11 min)

Part 1. Building Code History and Origin (30 min)

- Code of Hammurabii, Babylonia (circa 2000 BC) - Over 400 rules
- Socrates (341 BC) Inspections, setting of joints, dowel with iron, two dowels per stone
- London (1189 AD) Reaction to fires, limit on wood, plastering of thatched roofs
- Industrial Revolution (1800 to 1845) Over 400 improvement acts in 208 English towns
- Metropolitan Buildings Act (1845) to coordinate enforcement
- France (1852 to 1870) First model city efforts, limit on building height and redevelopment
- United States, Cause and Effect, Chicago fire 1871, San Francisco earthquake 1906
- Florida, Georgia, Louisiana hurricanes 1992

Types of National Building Codes

- National Building Codes
- Model Building Codes

Code Scope

- Structural Integrity
- Fire Safety
- Health Standards
- Noise Mitigation
- Accessibility
- Energy Conservation
- Indoor Air Quality

Code Scope Does not Include:

- Aesthetics
- Traffic Convenience
- Building Use
- Required Upgrades

Building Code Components

- Specifications for types of construction
- Allowable installation methodologies
- Minimum and maximum room and exit sizes and locations
- Fire and life safety elements

National Building Code Organizations

- BOCA (1915) Building Officials and Code Administrators (Central and eastern US)
- ICBO (1922) International Conference of Building Officials (Western US)
- SBCCI (1941) Southern Building Code Conference International (South, southeast)
- ICC (1994) International Code Conference (National and international)

Oregon Codes (Portland)

- Plumbing (1888)
- Building (1907)
- Electrical (1925)
- Mechanical (1948)

Current State Adoptions

- 2011 National Electrical Code
- 2011 International Mechanical Code
- 2011 Uniform Plumbing Code
- 2011 International Building Code
- 2011 International Residential Code
- All with Oregon Amendments

Code Evolution

- Lifestyle Changes – Downsizing, smaller families
- Innovative Buildings – Smart, LEED, Green
- New Technology – Solar, fuel cells, greater efficiency
- New Methods and Materials – Lighter, stronger

Part 2. Working Effectively With Code Officials (11 min)

- Responsibilities of Code Officials
 1. Maintain inspection and plan records
 2. Verify plan accuracy and completeness
 3. Perform on-site inspections
 4. Assist with building industry questions

Relationship Builders

- Inspect the project prior
- Attend all inspections
- Maintain a professional attitude
- Assure availability of all documents
- Compliance is Never an Option -- How You Achieve it is!
- Know why the code official is there
- Ask to “walk the job” with them

When Bad Things Happen

- Correction Notices
- Disagreements
 - 1) Ask for code section cited
 - 2) Some codes open to interpretation
 - 3) Try to work out a compromise
 - 4) Consider a higher power

Code Options

- ORSC Section 104.10 – Modifications allowed
- ORSC Section 104.11 – Alternative methods, design and methods of construction and equipment
- ORS 455.060 – Rulings process on acceptable alternatives to design or materials

Part 3. Ten Common Code Errors or Omissions (22 min)

1. Plans not available or illegible – R106.5
2. Scope of work exceeds approved plans – R106.4
3. Firestopping missing – R602.8
4. Foundation re-steel not to specs – R403.1.4
5. Anchor bolt spacing not to specs – R403.1.8
6. Joists/beams over-bored/over-notched – R502.8
7. Sheathing nailing not to specs – R602.3
8. Load path incomplete – R601.2
9. Smoke and CO alarms – R313 and R326
10. Stairs/guardrails/handrails – R311.5 and R312

Part 4. Code Changes and How They Affect Your Work (40 min)

Permit Valuations – R108.3

- Must provide total project valuation including materials and labor
- Permit may be denied without total value verification
- Building official sets final valuation

Moisture Content – R109.1.4.1

- Maximum moisture content 19%
- Pertains to all framing lumber
- Contractor must verify before cover
- Verification via form to inspector

Emergency Escape – R310.1

- Required in all newly constructed basements
- Existing basements only required when creating habitable space

Opening Height – R310.1.2

- Egressable window openings
- Minimum height of opening – 24 inches
- Still requires net clear opening of 5.7 sq. ft.

Exterior Landings – R311.5.4

- Required when door opens out
OR
- Required when more than three risers
- May be up to 8 inches below top of threshold

Anchorage – R403.1.8.1

- Minimum ¼" x 3" x 3" plate washers required at mud sill to foundation connection for:
 1. all structures in Seismic Zones D1 and D2
 2. Limited to townhouses in Zone C

Wall Design – R602.3

Studs must be continuous from:

1. Foundation to floor diaphragm and floor to floor diaphragm and floor to roof diaphragm
OR
2. A designed system is required

Energy Efficiency – Chapter 11

Legislative Mandate

- More effective use of appliances, applications and products
- Designed to reduce energy use

Table N1101.1(1)

- Major changes result in a minimum 15% net energy efficiency increase
- Limited to one energy path for conventional wood framed construction
- Envelope component values reflect increased efficiency

N1101.1 Additional Measures

- Requires conformance with Table N1101.1(2) in addition to prescriptive path
- A minimum of two Additional Measures must be chosen
- Additional measures include six additional opportunities for increased efficiency of exterior envelope and seven options for more efficient heating and cooling appliances including solar, electric, and water heating

N1101.1(2)

Example Item #1 – High efficiency walls and windows

- Exterior Walls R-24/SIPS

AND

- Windows – Maximum 15% of conditioned floor area

OR

- Windows U-0.30

Table N1101.1(2)

Example Item #D - High efficiency energy water heating and lighting

- Fuel-fired on-demand water heater with a minimum efficiency of 0.80

AND

- 75% lighting replaced with CFLs

N1101.3 Additions – All additions must comply with Table N1101.1(1) Prescriptive Path 1 and 2 additional Measures from Table N1101.1(2)

1. Applies when the addition is 600+ Sq ft

OR

2. More than 40% of heated floor area

N1101.3 Additions – Small additions less than 600 sq ft or less than 40% of conditioned floor area

1. Must comply with the prescriptive path Table N1101.1(1)

AND

2. Must select ONE additional measure from Table N1101.1(2)

Additional measures do not apply to additions less than 200 sq ft or 15%

1101.2 Applied to Existing Buildings – Minimum Component Requirements for Existing Spaces

- Walls – R15
- Floors – R21
- Vaults – R21
- Flat Ceilings – R38
- Slab Edge – R10
- Basement Walls – R15
- Ducts – R8

N1101.4 Plans and Specifications

Plans are now required to include all of the following energy information:

- Envelope component materials
- R-values of insulating materials
- Window and door U-values
- HVAC efficiency performance values
- Lighting systems

M1503.4 Kitchen Exhaust Rates

Ranges and cook tops require:

1. Minimum 150CFM
2. Ducted range hoods

OR

3. Down draft exhaust

Must be ducted to building exterior

M1503.5 Residential Range Hoods

1. Hood fans capable of exceeding 400CFM require make-up air
AND

2. Automatically controlled to start and operate simultaneously with the exhaust system

Why do we need the requirement?

What are the alternatives?

1. Smaller fans
2. Commercial systems
3. Newer residential systems
4. HRV systems

M1507 Mechanical Ventilation

Mechanical ventilation required at:

1. Rooms with bathing facilities or spas

AND

2. Toilet or power rooms without an operable window

M1507.4 Duct Sizing Table

Duct size not based on fan outlet collar

Example from table:

Fan size	Min smooth duct	Min flex duct
80 cfm	4 inch	5 inch
100 cfm	5 inch	6 inch

M1507.3 Ventilation Rate

Minimum air flows from Table 1507.3

1. Bathrooms – 80CFM intermittent, 20CFM continuous
2. Powder rooms – 50CFM

M1507.3.1 Fan Sound Ratings

Fans with rooms in bathing facilities shall be limited to:

1. Maximum 1.0 sone for continuous vent fan
2. Maximum 3.0 sone for intermittent fan

M1507.4 Automatic Fan Controls

Dehumidistats, timers, or other automatic controls required for:

- Exhaust fans in rooms containing bathing facilities

Dwelling/Garage Separation

Table R302.6 specifics	
Separation	Material
From residence and attic	½" gypsum
From habitable above	5/8" type x
Walls supporting fca's	½" gypsum

R312.2 Deck Guards

Guards required to extend a minimum of 36 inches above the height of a fixed seat or platform

R501.3 Fire Protection of Floors

Requires the underside of floor systems to be protected with ½" gypsum or 5/8" plywood

Exceptions:

1. Residences with sprinkler systems
2. Floor assemblies directly over a crawl space
3. Unprotected area limited to 80 sq ft
4. Minimum 2 x 10 or greater sawn joists

R502.2.2.1 Deck Ledger Connection – Prescriptive Text and Table

Review table and footnotes carefully. Table limits include:

- Maximum 40# live and 10# dead loads
 - Minimum 2 x 8 nominal pressure treated ledger
 - Minimum 2x nominal band joist on sill plate
 - Minimum ½” diameter lags or through-bolts
 - Fasteners must be stainless or hot-dipped galvanized
 - Fastener spacing per table 502.2.2.1
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- Appendix T – Residential Requirements for Fire Sprinklers
 - Design and install per NFPA 13D
 - All system components listed
 - What is in store for the future?

Part 5. Legislative Code Changes (11 min)

Carbon Monoxide Detectors and Radon Mitigation

R326 Carbon Monoxide Alarms

New Construction

1. Required in every bedroom
- OR
2. Within 15 ft outside of all bedroom doors

Existing Dwellings

1. Required when a structural permit is obtained for interior work
- OR
2. When new carbon monoxide source is introduced into the dwelling

CO Alarm Requirements

Shall be listed as UL 2034 and installed per manufacturer’s instructions

Combination CO/Smoke Alarms

Shall be listed as ANSI/UL 2034 and ANSI/UL 217 and installed per manufacturer’s instructions

Required Power Sources

- May be either battery operated or A/C from building power source
- Plug-in devices allowed
- Hard-wired units require battery back-up

Appendix F - Radon

Applies to new construction in the following counties:

- Baker
- Clackamas
- Hood River
- Multnomah
- Polk
- Washington
- Yamhill

Underslab passive radon mitigation system as required by Appendix F

Power must be made available for future fan

AF 103.2 Subfloor Preparation

- 4" sand or ¾" aggregate placed below all concrete slabs on grade enclosing habitable space
- Covered by 6 mil poly sheeting lapped 12" at joints
- All punctures, tears and penetrations shall be sealed

AF 103.4.1 Floor Openings

- Openings around tubs, showers, pipes, wires or other objects that penetrate the slab shall be filled with polyurethane caulk or other approved sealant

AF 103.5.1 Crawl Spaces - Vents to the Exterior per Section 408.1

- Soil-gas retarder consisting of a continuous layer of 6 mil poly sheeting with joints lapped a minimum of 12 inches and extend to all foundation walls

AF103.5 and 103.6 Passive Vent Stack

- Applies to both slabs and crawl spaces
- Minimum 3" gas-tight plumbing "T" on its back below slab or ground cover in crawl
- Vertical pipe full-length to roof
- Labeled "radon reduction system" on each floor
- Terminates minimum 12" above roof and 10 ft from any openable window

AF103.8 and 103.12 Fan Power Source

- Vent pipe requires access for future fan installation
- System requires dedicated electrical circuit terminated in attic to provide power for future installation of active sub-slab depressurization system

QUESTIONS?

Any questions or comments regarding this course may be directed to Oregon Contractor Education via mail, phone, or email. Your question will be forwarded to the instructor, and you will usually receive a reply within 48 hours.

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This course is approved for two hours in CCB Core Continuing Education: Building Codes. Oregon Contractor Education is responsible for the content of this course.