Welcome

- Make sure your audio connection is working
- Have course materials ready

Appendix, Plans, 2020 Residential Code of NYS

Lesson 1
Introduction
Tools of the trade
This week we will find out:
- What the 2020 Residential Code of NYS is
- When should we or can we use the RCNYS
- What is in the RCNYS
- What to do if ‘it’ isn’t in the RCNYS

This week we will learn how to:
- Assist the applicant in the use of the RCNYS
- Obtain adequate information for a plan review
- Conduct a plan review using the RCNYS
- Conduct the required on site inspections

Authority to Enforce

- NYCRR Title 19 – Department of State
  - Chapter XXXIII – State Fire Prevention & Building Code Council
  - Sub Chapter A – Uniform Fire Prevention & Building Code
  - Part 1219 – NYSUFP&BC
  - Part 1220 Residential Code
So...What is the RCNYS?

- From the Preface:
  - “[A] comprehensive, stand alone* residential construction code,
  - that establishes minimum regulations for the construction of one- and two-family dwellings and townhouses
  - using prescriptive provisions”

When should the RCNYS be used?

- New Construction of:
  - One and two-family dwellings or
  - Multiple single family dwellings (townhouses)...
  - ≤3 stories in height above grade plane
  - Providing separate means of egress from each dwelling unit

The Residential Code should also be used to provide minimum requirements for:

- Additions
- Alterations
- Movement
- Repairs
- Replacement of equipment
- Demolition or Removal

All found in Appendix J

- Existing Buildings and Structures
• What is in the RCNYS?
  • The RCNYS includes prescriptive provisions for
    – Conventional Light Frame Construction
      • Wood / Dimensional lumber
    – Light-Gauge Steel Construction
      • Metal studs, joists and rafters
    – Masonry Construction
      • Block
    – Concrete Construction
      • Cast in-place

• The Big Picture – Where we’ve been
  – Course 9A
    • Permits and legal avenue to do our jobs
    • Building Code, State Laws and Regulations
  – Course 9B
    • Fire Safe Design – The Balanced Approach
  – Course 9C
    • Inspections of existing buildings
    • Fire Code, Property Maintenance Code, Existing Building Code
  – Course 9D
    • Basic construction principles – Structural and Equipment Requirements
    • Energy Code, Fuel Gas, Mechanical, Plumbing Code, Systems

• The Big Picture - Where we’re going
  – This course (9E) will address Residential Structures using a prescriptive format
    • Residential Code
    • Plan review using a formal review document
    • Virtual field inspections of typical construction practices.
  – Course 9F will cover General Building Construction
    • Building Code, Fire Code, Plumbing Code and Energy Code
    • Similar to this weeks format, a plan review course
    • A summary of the earlier courses.
Minimum Standards for Code Enforcement Training in NYS

Section 1208-3.2 (d)

Must be completed in the Shorter of:
18 months from the first course or
18 months from appointment as CEO or BSI

Failure to complete a basic training program within such time period shall result in the forfeiture of any and all accrued training credit unless an application for an extension is submitted, in writing, showing good cause.

• Course Materials
  – Student Appendix
    • Note taking
    • Supplemental information
    • Plan Review Checklist
  – Partial Single Family Plans
    • Yours to keep – BUT DON’T use them to build

• Course format
  – We will follow a 4 step process
    1. The instructor will introduce code sections through lecture
    2. Using a plan review sheet and a set of plans the class will conduct a plan review covering the code sections from the lecture
    3. The class and the instructor will perform virtual inspections through slides
    4. The class will take a final exam
• Are there any Questions or concerns at this point?

Lesson 1
Introduction
Tools of the trade

• Let’s Investigate
  • The Code Book … Cover to cover
  • The Plans … A cursory review
  • The Review Sheet … Our guide
• How the code is organized -

• **Part**  **Part III**
  - Chapter  Chapter 3
  - Section  Section R311

Let’s take a look at the Table of Contents…
Polling Question

Part VII of the Residential Code includes which Chapters?

a) Chapters 3 - 10  
b) Chapters 12 - 23  
c) Chapters 25 - 33  
d) Chapters 34 - 43

September 1, 2020

- Chapter 3  
  - Performance requirements  
    • Sets criteria for use of prescriptive chapters
- Chapters 4 through 43  
  - Prescriptive (specification) construction requirements  
    • All the "How to..." information

Student Exercise: Appendix Pg. 2

- Using the table of contents for the 2020 RCNYS answer 10 questions on the top of page 2 of the Appendix:
1. What Part of the Code addresses Plumbing?

2. What Chapter deals with Boilers And Water Heaters?

3. Which Section of the Code regulates footings?

4. Swimming Pools are regulated in what Chapter?

5. Minimum Room Areas are found in Part ___, Chapter ____, and Section ___?

6. Referenced Standards are found in Part ___ of the Residential Code?

7. Electrical Definitions are found in which Chapter?

8. Which Section of the code provides the requirements for Foundation Drainage?

9. What Chapter deals with Plumbing Fixtures?

10. Requirements for Roof Coverings are found in Part Chapter ____, Section ___ of the code.

- The Plans… a cursory review
  - No need to go into details just yet.
  - Have the rooms been labeled
  - Are there doors, windows, etc.
  - Does it meet the limitations of the ResCode
• DRAWINGS and SPECIFICATIONS
• DRAWINGS are QUANTITATIVE
  – (How many)
• SPECIFICATIONS are QUALITATIVE
  – (What type)
• Together these documents DESCRIBE a structure or building

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• Plan -
• A two-dimensional graphic representation of the design, location, and dimensions of the project, or parts thereof, seen in a horizontal view...
Polling Question

The rear elevation is shown on which page of the provided plans?

a) The Cover page
b) Page A3.06L
c) Page A8
d) Page A3.09L
**Specification** –
- A written document describing in detail the...
- scope of work
- materials to be used
- method of installation
- quality of workmanship
- usually utilized in conjunction with working drawings in building construction

Specifications may include Schedules
- Like a window and/or door schedule
- A General Notes section
- Etc

Plan view –
Looking at a ‘birds eye view’ as though the top of the building were removed
- Plot Plan
  - Locates the building on the property
  - Locates the
    - Water line
    - Septic line
    - Site utilities
  - Provides setback information

- Topographic Information
  - Contour lines show existing and proposed grades
  - Dotted/dashed lines show existing grade
  - Solid lines show proposed grade

- Dimensioning Systems
Section –
A representation of an object as it would appear if cut by an imaginary plane, showing the internal structure.
A representation of a building, or portion thereof, drawn as if it were cut vertically to show the interior.

| Sheets A3.02 and A3.03 |

Cutting Plane Detail

| BS-B/A3.04 | (LOCATION) (pg.#) | CUT PLANE |
| VIEW ANGLE |
Elevation View

1. A drawing showing the vertical elements of a building, either exterior or interior, as a direct projection to a vertical plane.

2. The vertical distance above or below some established reference level.
New York State Education Law

- Requires a Design Professionals seal and signature on drawings (with limited exceptions)

Title block from our plans this week
• Student Exercise: Appendix Pg. 2
• Using the plans, answer the 12 questions on the bottom of page 2 in your appendix

1. The Foundation Drawings indicate that the 3” steel columns shall be gauge steel pipe.
2. Exterior wood frame walls are to be constructed, using 2”x 6” studs placed ____ inches on center.
3. The wall covering on the common wall between the dwelling and the attached garage, are to be GWB
4. The Elevation Drawings are drawn to a _____________ scale.

5. Gas Meter and Electric Meter locations are shown on which page?
6. The steel door between dwelling and garage shall have a self-closing device and a fire resistant rating label.
7. The initials, WIC in the area between the master bedroom, and the master bathroom represent ______ .
8. The plans indicate that all bedroom windows will have a minimum net clear opening of____.
9. The plate height of Bedroom #3 is 

10. Ice shield placement is shown in the plans on sheet labeled

11. The rough opening for the breakfast area door is.

12. The concrete garage floor is to be sloped inches from the wall to the garage door.

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- The Plan Review Document
  - An indispensable aide to the process
  - Provides project information
  - Allows an organized, coherent review
  - Keys in to important/critical code sections
  - Insures the reviewer stays focused

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A plan review sheet should be used to conduct a plan review
A good plan review sheet will lead you to important code sections that should not be overlooked
A plan review sheet should never be used in place of the RC book
A plan review sheet should never be considered to be all inclusive
For ease in identifying sections of the code needed for a particular plan review, the review sheet has been broken into several parts:

- Form 1 Master
- Form 2 Foundations
- Form 3W Wood frame construction
- Form 3S Steel frame construction
- Form 3M Masonry or Concrete construction
- Form 4 Roof construction
- Form 5 Plumbing-Mechanical-Fuel Gas-Energy Code
- Form 6 Appendix J – Existing Buildings and Structures

Fill out with information from the application.

Top rows based on local conditions.

Bottom rows to verify information on the plans.

Check off forms used for review.
• We’ve looked at the tools of the trade
  – The 2020 RCNYS
  – The Plans
  – The Plan Review Document
• In the next lesson we will begin the actual review process.
Lesson 2
Chapter 1 Scope & Administration
Chapter 3 Building Planning

[NY] R101.2 Scope
The Residential Code shall apply to...
Detached One-and two-family dwellings and
Multiple single-family dwellings (townhouses)
- Not more than 3 stories in height above grade plane*
- That provide a separate means of egress
- And their accessory structures

• STORY ABOVE GRADE PLANE.
• Any story having its finished floor surface entirely above grade
  plane, or in which the finished surface of the floor next above is any
  of the following:
  • 1. More than 6 feet (1829 mm) above grade plane.
  • 2. More than 6 feet (1829 mm) above the finished ground level for
    more than 50 percent of the total building perimeter.
  • 3. More than 12 feet (3658 mm) above the finished ground level at
    any point.
What is a Townhouse?

Would this work? NO!

See definition of Townhouse

Accessory Structures

Reminder: Small storage sheds (up to 144 sq. ft.) may be exempt from permit requirements in accordance with Local Law, otherwise they would be regulated by the Residential Code.
Accessory Structures

Swimming pools and their attendant barriers are never exempt and are regulated in the Residential Code.

[NY] R101.2 continued:

4. Bed & Breakfast Dwellings
5. Live/work units located in townhouses complying with Section 419 of the 2020 BCNYS... constructed to the 2020 RCNYS... Fire suppression shall conform to Section P2904 of the 2020 RCNYS
6. Owner-occupied lodging houses... constructed to 2020 RCNYS where equipped with a fire sprinkler system in accordance with Section P2904.

P2904 Dwelling Unit Fire Sprinkler Systems
Design and installation per NFPA 13D
OR Section P2904
Which shall be considered equivalent to NFPA 13D
P2904.1 General
P2904.2 Sprinklers
P2904.3 Sprinkler Piping System
P2904.4 Determining System Design Flow
P2904.5 Water Supply
P2904.6 Pipe Sizing
P2904.7 Instructions and Signs
P2904.8 Inspections

This code also regulates …
- Bed and Breakfast
- Conversion to BB in Appendix J
- NY State designated facilities
- Community Residences
- Hospice Residences
- Factory built homes
  - Factory Manufactured Homes
  - Modular Homes
  - Manufactured Homes
  - HUD Approved
  - Mobile Homes
- Pre-1976

Polling Question
The Residential Code applies to all of the following except?

a) Single family home 2 stories above grade plane
b) Two-family dwellings 3 stories above grade plane
c) Bed and Breakfast dwellings 3 stories above grade plane
d) Individually owned condominiums in a 5-story building
Introduction to Factory Constructed Dwellings

What is a Factory Manufactured Home?
As defined in 19 NYCRR Part 1209.1
A structure designed as a dwelling
Constructed in a manufacturing facility
Transportable in sections
Intended for a permanent foundation
Bearing a NYS Insignia of Approval signifying conformance to design and construction requirements of the
NYS Uniform Fire Prevention and Building Code

AKA: Modular Home
What is a Manufactured Home?

19 NYCRR Part 1210.1(b)

A structure designed as a dwelling

Manufacturers may not design or build HUD code homes for multifamily or other non-single family residential use.

Dealers may not sell HUD code homes for purposes other than single family use
What is a Manufactured Home?

• A structure designed as a dwelling
• Transportable in one or more sections
• 8 feet wide (or more) in the traveling mode
• 320 square feet or larger
• Built on a permanent chassis
• With or without a permanent foundation
• Pre-installed plumbing, heating, hvac
• Built after June 15, 1976

And…
What is a Mobile Home?

- A structure designed as a dwelling
- Built before June 15, 1976

And...

With or without a label certifying compliance with NFPA, ANSI or a specific state standard.

What is a Park Model Home?

- A structure designed as a temporary dwelling
  - Seasonal Use
  - Transportable by LD truck
  - Built on a single chassis
  - 400 Sq Ft or less

- With or without a label certifying compliance with ANSI A119.5 "Recreational Vehicle" standard.
What is a Trailer?

Executive Law
Article 21-b and
19 NYCRR Part 1210
"Manufactured Homes"

Certification

"On or after July 1, 2006 no person or business entity shall..."

Manufacture, Sell, Install or Service a Manufactured Home unless

The person or business entity is certified and
At least 1 certified person is on-site
Certification Types

- Manufacturer
- Installer
- Retailer
- Mechanic: Any person or business entity performing service
  - Service: The modification, alteration or repair of the structural systems of a manufactured home

Diaphragm construction

Warranty Seals

- Guarantee from the Manufacturer
  - Approved by HUD
  - Construction per HUD code
  - Certified by DOS

- Guarantee from the Installer
  - Installed per code
  - Installer Certified by DOS
  - Foundation approved
  - Also for “Owner-occupant”

Warranty Seals

- Guarantee from the Manufacturer
  - Approved by HUD
  - Construction per HUD code
  - Certified by DOS

- Guarantee from the Installer
  - Installed per code
  - Installer Certified by DOS
  - Foundation approved
  - Also for “Owner-occupant”

Private Sale

N/A

N/A

George Porter

1542 Porter Blvd., E. Whatever, NY 33333

1INT111111 (999) 999-9999

01/15/2010 T/Sometown
Warranty seals
- Permanently attached
  - Largest closet in the largest bedroom

Local Code Enforcement Official
- Who is the certified installer (listed on Application)
- Certified installer on site during installation (Verify)
- Inspections during installation (Anything done on site)
- Installer warranty seal affixed – 9 NYCRR Part 1210.16(g)(2)
- Installation conforms to installation instructions
Polling Question

A manufactured home is designed and constructed in accordance with?

a) The Residential Code of New Your State
b) The International Residential Code
c) 24 CFR Part 3280
d) 19 NYCRR Part 1210

[NY] R102  Applicability

General Rules

- Most restrictive requirement ALWAYS applies ([NY] R102.1)
- In a conflict, "Specific" code requirements trump general provisions and ([NY] R102.1)
- In a conflict between the Code and a Standard, the Code rules ([NY] R102.4.1)
[NY] R102.7 Existing Structures
- Legal occupancy permitted to continue, with exceptions
- Code NOT applicable to existing portions of the structure unless specifically stated

What You Won’t Find in the Residential Code:
- Construction type
  - Assumed to be light-frame, which is typical for ResCode dwellings
- Maximum building height and area
  - 3 story maximum height above grade plane
    - If >3 stories, the Building Code applies
  - Prescriptive Chapters MAY limit height and/or size
- Habitable space location limitations
  - Must meet all requirements for light, ventilation, room dimensions, etc.

Is our project within the Scope and Applicability of the Residential Code?
- Yes.
  - It is a Single family dwelling,
    3 stories or less above grade plane,
    of conventional light frame construction
Lesson 2

Chapter 1: Scope & Administration

Chapter 3: Building Planning

Part I – Climatic Criteria

Chapter 3, Building Planning

Sections R301 through R327

Topic 1: Structural Design Criteria

• Forces
• Potential for damage
• Minimum Live Loads
Chapter 3, Building Planning

Topic 1

“Design Criteria”

Sets conditions for use of the PRESCRIPTIVE Chapters

Prescriptive provisions

– The intent of this code is to allow the design and construction of a structure using **proven and recognized methods and materials.**

– If all the elements of the light frame construction comply with the code, no additional engineering is required!

R301.1 Application

– All buildings and structures must be constructed to safely support all loads
  – Dead loads, Live loads and Environmental loads
    • Snow, Wind, Seismic and Flood loads
– Loads must be transferred …
  – Through the structural load path
  – To the supporting soils
R301.1.3 Engineered Design

When...

– Structural elements exceed the limits of Chapter 3
– Or...are not specifically listed in the Residential Code

"...those elements shall be designed in accordance with accepted engineering practice..."
Our project home is located in Schoharie County.

Let's find the Ground Snow Load Map...

Footnote: The ground snow loads... for sites at elevations up to 1000 feet. Sites at elevations above 1000 feet... (add) 2 psf for every 100 feet above 1000 feet.
R301.2.1 Wind Design Criteria
Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design wind speed in Table R301.2(1) as determined from Figure R301.2(4)A.

R301.2.1.4 - Exposure Categories (for Wind)

Exposure “B” [Shall be assumed unless site meets another category]
Urban/suburban, low-rise construction, fairly dense

Exposure “C”
Open terrain, scattered obstructions, surface undulations generally < 80’ for 1,500’ in any direction
Also for Exposure B sites with Exposure C conditions on any side for 600’ or more
Flat open country and grasslands

Exposure “D”
Flat, unobstructed areas with wind flowing over water, smooth mud flats, salt flats, unbroken ice for not less than 5,000’, but only for buildings directly exposed
Includes hurricane prone areas as well as shorelines of inland water bodies
R301.2.1.5 Topographic wind effects.

In areas designated in Table R301.2(1) as having local historical data, topographic wind effects shall be considered in the design in accordance with Section R301.2.1.5.1 or ASCE 7.
Polling Question

What wind exposure category includes open terrain with scattered obstructions generally less than 30’ in height?

a) A  
b) B  
c) C  
d) D
That takes care of established Ground Snow Load and Wind Design (Basic Wind Speed, Topographic Effects, Special Wind Region, Wind-Borne Debris Zone)

Next let's look at Seismic Design Category...

**R301.2.2 - Seismic Provisions**

ONLY applies to Seismic Design Categories C and D

- NY has several C and D category areas!
- Detached one- and two-family in category C are EXEMPT
- Additional seismic requirements found in prescriptive construction chapters...

A partial view of Figure R301.2(2) from the RCNYS reveals that our project is located in Seismic Design Category B.
Seismic Design Category: B

The next three items look at potential damage. Two of the three are addressed with maps: Weathering and Termite Damage. The third, frost depth, is a local determination, in this case 48”.

Frost depth is a local determination

There is no established map for frost depth

The locally determined frost depth for Schoharie County is 48”
Based on the maps, our weathering potential is ‘severe’. Local determination for frost depth is 48”. Potential for termite damage is ‘moderate’. Next item to evaluate is Winter Design Temperature.
Winter Design Temperature, per Appendix D of the IPC, is approximately 1 degree Fahrenheit.

Next item, Ice Barrier Underlayment

- h. In accordance with Sections R905.1.2, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with "YES." Otherwise, the jurisdiction shall fill in this part of the table with "NO."

Every NYS jurisdiction has a history of ice damming, so ‘Yes’ gets added to the table.

Flood Hazards sends us to footnote g
g. To establish flood hazard areas, each community shall adopt a flood hazard map and supporting data. The map shall include, at a minimum, special flood hazard areas as identified by FEMA, as amended or revised with:
   - i. The accompanying Flood Insurance Rate Map (FIRM),
   - ii. Flood Boundary and Floodway Map (FBFM), and
   - iii. Related supporting data along with any revisions thereto.

The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.
Our local AHJ advises us that the jurisdiction entered into the NFIP April 1, 1992.

Air Freezing Index, cumulative degree days below 32°F, is next.

i. The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)" at www.ncdc.noaa.gov/fpsf.html.
As an alternative to the map, which can be difficult to read and interpret, there is also Table [NY] R403.3(2) that provides a New York State list with multiple columns for various AFI ratings (next slide).

### Table R403.3(2)

<table>
<thead>
<tr>
<th>STATE</th>
<th>1000 or less</th>
<th>2020</th>
<th>2020</th>
<th>2040</th>
<th>4060</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>All counties</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Polling Question

According to Table R403.3(2), the air-freezing index for Putnam County is?

a) 1,500 or less  
b) 2,000  
c) 2,500  
d) Not shown
Both the map and the table concur:

2000 degree days is appropriate for Schoharie County.

The last item is Mean Annual Temperature, Footnote j tells us...

• j. The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)".

• http://www.ncdc.noaa.gov/sites/default/files/attachments/Air-Freezing-Index-Return-Periods-and-Associated-Probabilities.pdf
• The NOAA website uses weather stations throughout the country to establish
values. The closest 2 found were Albany WSO at 47.3°F and Cooperstown at
45.2°F. Schoharie County is in between these two locations.

• That completes this portion of the table. The next part of the table is
These details will help to ensure that the HVAC System design is
based on anticipated loads.
### Student Exercise – Complete Section 3 of the Plan Review Document

<table>
<thead>
<tr>
<th>Climatic &amp; Geographic Design Criteria</th>
<th>Construction Method Limits</th>
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<tbody>
<tr>
<td>Wind Directions and wind design</td>
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<td>Where wind design is required per</td>
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<td>Wind Speed</td>
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<td>Topographic Wind Speed-Up Effects</td>
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<td>Special Wind Region</td>
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<td>Sunrooms</td>
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<td>Exposure Category</td>
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<td>Seismic –</td>
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<td>1 &amp; 2 family in Seismic D0, D1</td>
<td>R301.2</td>
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<td>Townhouses in Seismic C, D0, D1</td>
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<td>Seismic Design Category</td>
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| R301.2                              |                           |
| R301.2.1.1                          | Fig R301.2(2)             |
| R301.2.1.1.1                         |                            |
| R301.2.1.2                          |                            |
| R301.2.1.3                          |                            |
| R301.2.1.4                          |                            |
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| R301.2.1.71                         |                            |
| R301.2.1.72                         |                            |
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| R301.2.1.123                        |                            |
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| R301.2.1.128                        |                            |
| R301.2.1.129                        |                            |
| R301.2.1.130                        |                            |
| R301.2.1.131                        |                            |
| R301.2.1.132                        |                            |
| R301.2.1.133                        |                            |
### From Chapter 2 - Definitions

**LIVE LOADS**
Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

---

### Table R301.5

<table>
<thead>
<tr>
<th>USE</th>
<th>LIVE LOADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninhabitable attics without storage</td>
<td>10</td>
</tr>
<tr>
<td>Uninhabitable attics with limited storage</td>
<td>20</td>
</tr>
<tr>
<td>Balconies (exterior) and decks</td>
<td>40</td>
</tr>
<tr>
<td>Fire escapes</td>
<td>40</td>
</tr>
<tr>
<td>Guardrails and handrails</td>
<td>200</td>
</tr>
<tr>
<td>Passenger vehicle garages</td>
<td>50</td>
</tr>
<tr>
<td>Rooms other than sleeping rooms</td>
<td>40</td>
</tr>
<tr>
<td>Sleeping rooms</td>
<td>30</td>
</tr>
<tr>
<td>Stairs</td>
<td>40</td>
</tr>
</tbody>
</table>

---
### Table R301.5

<table>
<thead>
<tr>
<th>Category</th>
<th>Live Load (psf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninhabitable attic without storage b</td>
<td>10 psf</td>
</tr>
<tr>
<td>Uninhabitable attic with limited storage b, g</td>
<td>20 psf</td>
</tr>
<tr>
<td>Habitable attic and attic w/ fixed stair</td>
<td>30 psf</td>
</tr>
<tr>
<td>Staircases (open riser) and deck e</td>
<td>40 psf</td>
</tr>
<tr>
<td>Fire escapes</td>
<td>40 psf</td>
</tr>
<tr>
<td>Guards and handrails d</td>
<td>50 psf</td>
</tr>
<tr>
<td>Guard in-fill components f</td>
<td>50 psf</td>
</tr>
<tr>
<td>Passenger vehicle garages a</td>
<td>60 psf</td>
</tr>
<tr>
<td>Rooms other than sleeping rooms</td>
<td>70 psf</td>
</tr>
<tr>
<td>Sleeping rooms</td>
<td>80 psf</td>
</tr>
<tr>
<td>Stairs</td>
<td>90 psf</td>
</tr>
</tbody>
</table>

### Polling Question

Guards and handrails must be capable of resisting how much force applied at any point along the top?

- a) 40 pounds per square inch
- b) 200 pounds per square foot
- c) 50 pounds per square foot
- d) 200 pounds per square inch

### Topic 2

Requirements for:
- Fire Resistant Construction
- Habitability
- Fire Safety and Protection
### R302 Fire Resistant Construction

- **Exterior walls**
  - Table R302.1(1) Non-Sprinklered or Table R302.1(2) Sprinklered
    - **Exceptions**
      - Does not apply in walls that are perpendicular
      - Does not apply to dwellings and accessory structures on the same lot
      - Sheds and playhouse if Permit is Not Required, but can't cross lot line
      - Detached Garage allowed within 2', eaves projection 4' maximum
      - Foundation vents permitted

<table>
<thead>
<tr>
<th>Extinguishing Agent</th>
<th>Services Required</th>
<th>Storage Required</th>
<th>Materials Required</th>
<th>Fire Resistant Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Foam</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>CO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Halon</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>High Pressure Nitrogen</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (CO&lt;sub&gt;2&lt;/sub&gt;)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Halogen)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Nitrogen)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Halon)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Carbon Dioxide)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (CO&lt;sub&gt;2&lt;/sub&gt;) (Fire Resistant)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Halogen) (Fire Resistant)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Nitrogen) (Fire Resistant)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Halon) (Fire Resistant)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
<tr>
<td>Dry Chemical (Carbon Dioxide) (Fire Resistant)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2 hours</td>
</tr>
</tbody>
</table>

---

September 1, 2020
R302.5 Dwelling/garage opening/penetration protection.
Openings and penetrations shall be in accordance with Sections R302.5.1 through R302.5.3.

R302.5.1 Opening protection.
Into a room used for sleeping purposes, not permitted.
Others, equipped with solid wood doors not less than 1 3/8", steel doors not less than 1 3/8", or 20-minute fire-rated doors, (all) with a self-closing device.

- R302.6 Dwelling/garage fire separation.
  - Shall be separated as required by Table R302.6.
  - Openings in garage walls comply with Section R302.5.
  - Does not apply to walls perpendicular to the dwelling
TABLE R302.6 DWELLING/GARAGE SEPARATION

<table>
<thead>
<tr>
<th>SEPARATION</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the residence and attics</td>
<td>Not less than 1/2-inch gypsum board or equivalent applied to the garage side</td>
</tr>
<tr>
<td>From all habitable rooms above the garage</td>
<td>Not less than 5/8-inch Type X gypsum board or equivalent</td>
</tr>
<tr>
<td>Structure(s) supporting floor/ceiling assemblies used for separation required by this section</td>
<td>Not less than 1/2-inch gypsum board or equivalent</td>
</tr>
<tr>
<td>Garages located less than 3 feet from a dwelling unit on the same lot</td>
<td>Not less than 1/2-inch gypsum board or equivalent applied to the interior side of interior walls that are within this area</td>
</tr>
</tbody>
</table>

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FIRST FLOOR PLAN

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5 Fire Resistant Construction

- Detached Garage
  - Townhouses: R302.2
  - Two-Family Dwellings: R302.3
  - R302.4
  - Dwelling-Garage Coating Protection: R302.5
  - Dwelling-Garage Fire Separation: R302.6
  - Under-Garage Protection: R302.7
  - Alarm Panels: R302.8
  - Flame Spread/Smoke Developed: R302.9
  - Insulation: R302.10
  - Framing: R302.11
  - Sheathing: R302.12
  - Fire Protection of Floors: R302.13
  - Combustible Insulation Clearance: R302.14

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Our interior finish materials are generally Gypsum.

Even standard GWB has very low Flame Spread and Smoke Developed ratings using the ASTM E-84 test method.

Proposed insulation is fiberglass batt full depth of the wall cavities, and ceiling insulation is to be flat to the ceilings.

No foam plastics are proposed.

Polling Question

The required separation between an attached garage and habitable space above is?

a) ½” Gypsum board
b) A 1 3/8” thick solid wood door
c) A 45-minute rated assembly
d) 5/8” Type X gypsum or equivalent
**R302.10.1 Insulation.**

- Insulation materials, including facings,
- Installed within the building
- Flame spread index not to exceed 25
- Smoke-developed index not to exceed 450

**Exceptions:**

1. Where installed in concealed spaces… does not apply to the facings, provided the facings is installed in substantial contact with the unexposed surface
2. Cellulose loose-fill insulation… only be required to meet the smoke-developed index
3. Foam plastic insulation shall comply with Section R316.

---

**302.13 Fire Protection of Floors**

Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch gypsum wallboard membrane, 5/8-inch wood structural panel membrane, or equivalent on the underside of the floor framing member

**Exceptions:**

1. Floor assemblies located directly over a space protected by an automatic sprinkler system
2. Floor assemblies located directly over a crawl space
3. Portions of floor assemblies shall be permitted to be unprotected where complying with the following:
   3.1. The aggregate area does not exceed 80 square feet
   3.2. Fireblocking in accordance with Section R302.11.1 is installed
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch
Lesson 2
Chapter 1 Scope & Administration
Chapter 3 Building Planning
Part III – Habitability

Section R303 - Light, Ventilation, and Heating
- R303.1 – Habitable Rooms: 8% for Light, 4% for Ventilation w/exceptions
- R303.2 – Adjoining Rooms: May ‘borrow’ Light and Ventilation w/conditions
- R303.3 – Bathrooms: Minimum 3 s.f. for Light, half openable for ventilation or...
- R303.4 – Mechanical Ventilation: ≤ 5 ACH, Whole house mechanical required
- R303.5 – Opening Location: Intake and Exhaust
- R303.6 – Outside Opening Protection for intake and exhaust openings
- R303.7 – Interior Stairway Illumination
- R303.8 – Exterior Stairway Illumination
- R303.9 – Required Glazed Openings
- R303.10 – Required Heating
From Chapter 2 - Definitions

HABITABLE SPACE.
A space in a building for living, sleeping, eating, cooking or used as a home occupation. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

R303  Light, Ventilation and Heating
R303.1 – Habitable rooms
- Natural light
  - Minimum glazing area = 8% of the floor area
  - Actual glazing area
- Natural ventilation
  - Minimum openable area = 4% of the floor area
  - Clear open area in normal full open position

Natural Light and Ventilation
- Natural Light
  - Calculate total surface area of all glazing in the room
- Natural Ventilation
  - Calculate the total area of all doors, windows and louvers in the room that open to outside air
Student Exercise – After an Example

Step 1:
• Find this window chart in the appendix of your workbook

2 pages:
• Vent Units
• Fixed and Transom

Light and Ventilation Example

Bedroom #2
• Room area is 14' x 12' = 168 SF
• Req'd light is 8% (168 x 0.08 = 13.44 s.f.)
• Req'd ventilation 4% (168 x 0.04 = 6.72 s.f.)
• Window is “E”
  • From the Window Schedule
  • PTD 2953-2
  • 2 units
Using the Pella Window information in your Appendix

<table>
<thead>
<tr>
<th>Unit</th>
<th>Clear Opening Width (inches)</th>
<th>Height (inches)</th>
<th>Vent Area Ft²</th>
<th>Visible Glass Area Ft²</th>
<th>Frame Area Ft²</th>
<th>Performance Class &amp; Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>2953</td>
<td>25-13/16</td>
<td>23-1/4</td>
<td>4.2</td>
<td>7.8</td>
<td>10.7</td>
<td>R50</td>
</tr>
</tbody>
</table>

September 1, 2020

Natural Light and Ventilation Worksheet

<table>
<thead>
<tr>
<th>Room/Floor</th>
<th>Floor area (sq ft)</th>
<th>Required Light (8% of Floor Area)</th>
<th>Proposed Light</th>
<th>Required Ventilation (4% of Floor Area)</th>
<th>Proposed Ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom 2</td>
<td>168 S/F</td>
<td>13.44 S/F</td>
<td>2x7.8=15.6SF</td>
<td>6.72 S/F</td>
<td>2x4.2=8.4SF</td>
</tr>
<tr>
<td>Family Room</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loft</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Student Exercise:
- Using your 2020 RCNYS, the plans, and your appendix, complete the light and ventilation worksheet in the appendix for the following rooms:
  - Bedroom 2 (the example)
  - Bedroom 3
  - Family Room
  - Loft

On your own
PLAN REVIEW
Bedroom #3
Family Room
Loft

Use this window chart in the Appendix — AND ...

September 1, 2020

Natural Light and Ventilation Worksheet

Room/Floor  Floor area (sq ft)  Required Light (8% of Floor Area)  Proposed Light  Required Ventilation (4% of Floor Area)  Proposed Ventilation

Bedroom 2
168 S/F  13.44 S/F  2x7.8=15.6SF  6.72 S/F  2x4.2=8.4SF

Bedroom 3

Family Room

Loft

R303.2 – Adjoining Rooms

- Allowance to “borrow” light / ventilation from adjacent rooms
- Must meet the ‘openness’ requirements
  - Minimum 1/2 of common wall open
  - Minimum 1/10 of interior room area
  - Minimum 25 s.f.
R303.2 – Adjoining Rooms

In order to ‘borrow’ light and ventilation:
1. Calculate total floor area for both rooms
2. Windows in living room must equal 8% of total floor area
3. Operable windows in living room must equal 4% of total floor area
4. Apply opening criteria in R303.2 for adjoining rooms

Section C from Sheet A3.04L

Does the opening between the Family room and the Loft meet the ‘openness’ criteria?

Natural Light and Ventilation Worksheet

<table>
<thead>
<tr>
<th>Room Type</th>
<th>Natural Light</th>
<th>Proposed Light</th>
<th>Ventilation</th>
<th>Proposed Ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedroom 2</td>
<td>168.64 S/F</td>
<td>13.44 S/F</td>
<td>2x7.8=15.6SF</td>
<td>6.72 S/F</td>
</tr>
<tr>
<td>Bedroom 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>236.96 S/F</td>
<td>19.32 S/F</td>
<td>22.7 S/F</td>
<td>10.1 S/F</td>
</tr>
<tr>
<td>Loft/Loft</td>
<td>173.50 S/F</td>
<td>14.65 S/F</td>
<td>15.3 S/F</td>
<td>7.5 S/F</td>
</tr>
<tr>
<td>Master</td>
<td>173.50 S/F</td>
<td>14.65 S/F</td>
<td>15.3 S/F</td>
<td>7.5 S/F</td>
</tr>
<tr>
<td>Parlor/Living Rm</td>
<td>236.96 S/F</td>
<td>19.32 S/F</td>
<td>22.7 S/F</td>
<td>10.1 S/F</td>
</tr>
<tr>
<td>Dining Room</td>
<td>173.50 S/F</td>
<td>14.65 S/F</td>
<td>15.3 S/F</td>
<td>7.5 S/F</td>
</tr>
</tbody>
</table>
R303.3 – Bathrooms

- Special rule for bathrooms and water closet compartments
  - Minimum 3 square feet aggregate glazing
    - Half of which must be openable
  - Exception for artificial light and local exhaust system
    - Typically a ceiling light and fan
      - Fan exhaust rate per M1507
        - Kitchens – 100 cfm intermittent, 25 cfm continuous
        - Bathrooms/Toilet rooms – 50 cfm intermittent, 20 cfm continuous

R303.4 – Mechanical Ventilation

- Air infiltration rate < 5 ACH
  - Whole house ventilation per M1507.3
    - In accordance with Table M1507.3.3(1) (next slide)
      - Based on dwelling unit floor area and number of bedrooms
      - Table M1507.3.3(1) for continuous
      - Table M1507.3.3(2) for intermittent
        - Provides a factor, or multiplier, for the values in table 1
R303.5 – Opening Location

- **R303.5.1 – Intake Openings**
  - Not less than 10' from hazardous/noxious contaminants
  - D. U. Toilet rooms, bathrooms, and kitchens shall not be considered hazardous or noxious
  - 3 exceptions

- **R303.5.2 – Exhaust Openings**
  - Shall not be directed onto walkways

R303.6 – Outside Opening Protection

- Protect with screens, louvers, or grilles
- Keep the air moving, keep the critters out.

---

[NY] R303.7 – Interior Stairway Illumination

- Provide light for treads and landings
- Provide switch at each floor level
- Light activation
  - Switch at each floor level where there are 6 or more risers
  - Control exterior stairway illumination from inside the dwelling
[NY] R303.8 – Exterior Stairway Illumination
- Provide artificial light at top landing
- If the exterior stairway provides access to a basement from the outdoor grade level, provide light at bottom landing

R303.9 – Required Glazed Openings
- Shall open directly on to a street, alley, yard, or court
  - Located on the same lot
  - 3 exceptions for under porches, eaves, and decks, balconies, etc
- R303.9.1 – Sunroom Additions
  - Allows required glazing to open into sunroom additions and patio covers with conditions.

[NY] R303.10 – Required Heating
- Capable of maintaining 68°F in habitable rooms
  - 3' above floor
  - 2' from an outside wall
  - Space heaters cannot be used for this purpose
- Exception: Owner occupied one-family dwellings subject to the approval of the building official
### Polling Question

Required natural light for a habitable room shall be a minimum of what percentage of the floor area?

- a) 4%
- b) 6%
- c) 8%
- d) 10%

---

### Minimum Room Areas

<table>
<thead>
<tr>
<th>7</th>
<th>Minimum area</th>
<th>R304.1</th>
<th>R304.2</th>
<th>R304.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Minimum dimensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Height effect on room area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceiling Height</td>
<td>Minimum height</td>
<td>R305.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basements</td>
<td></td>
<td>R305.1.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sanitation

<table>
<thead>
<tr>
<th>8</th>
<th>Toilet fixtures</th>
<th>R306.1</th>
<th>R306.2</th>
<th>R306.3</th>
<th>R306.4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td></td>
<td>R306.1</td>
<td>R306.2</td>
<td>R306.3</td>
<td>R306.4</td>
</tr>
<tr>
<td>Sewage disposal</td>
<td></td>
<td>R306.1</td>
<td>R306.2</td>
<td>R306.3</td>
<td>R306.4</td>
</tr>
<tr>
<td>Toilet, Bath and Shower Spaces</td>
<td></td>
<td>R307.1</td>
<td>R307.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
R304 - Minimum Room Areas
- R304.1 – Minimum area.
  - Habitable rooms 70 s.f. minimum
    - Except kitchens
- R304.2 – Minimum dimensions.
  - Habitable rooms not less than 7' in any horizontal dimension
    - Except kitchens
- R304.3 – Height effect on room area
  - Sloped and furred ceiling rules

R305 – Ceiling Height
- R305.1 – Minimum height
  - Habitable spaces and hallways (including within basements)
    - 7' minimum
  - Bathrooms, toilet rooms, laundry rooms
    - 6' 8" minimum
    - 3 exceptions - sloped ceilings; bathroom fixture usability; beams/girders/etc.
- R305.1.1 - Basements
  - Without habitable spaces or hallways, 6' 8"
    - Exception – at beams, girders, etc. – 6' 4"

R306 - Sanitation
- NYS allows owner occupied single family dwellings to be exempt from these requirements when approved
  - Provide a kitchen and a kitchen sink
- R306.3 – Sewage disposal
  - Connect to sanitary sewer or approved private sewage disposal system
- R306.4 – Water supply to fixtures
  - Plumbing fixtures connected to an approved water supply
  - Kitchen sinks, lavatories, bathtubs, showers, bidets, laundry tubs, washing machines **ALL** require hot and cold water
R307 – Toilet, Bath and Shower Spaces

R307.1 – Space Required
- Spaced in accordance with Figure R307.1 (Next slide)
- And Section P2705.1

R307.2 – Bathtub and Shower Spaces
- Nonabsorbent surface to a minimum 6’ above the floor

<table>
<thead>
<tr>
<th>Minimum Room Areas</th>
<th>R304</th>
<th></th>
<th>R305</th>
<th>See table</th>
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<td></td>
<td></td>
<td>R307.7</td>
<td>OK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 70 square feet (except kitchens)
- 7’ in any horizontal direction
- Under sloped ceiling, <5’ high does not contribute to room area
- Clothes are stored in downstairs area
- 8’ & OK
- 5’ & OK
- 6’ & OK

- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
- OK
Lesson 2

Chapter 1 Scope & Administration
Chapter 3 Building Planning
Part IV – Life Safety

R308 - Glazing
- R308.1 – Identification
- R308.2 – Louvered windows or jalousies
- R308.3 – Human impact loads
- R308.4 – Hazardous locations
- R308.5 – Site-built windows
- R308.6 – Skylights and sloped glazing

R308.1 – Identification
- Requires labeling in ‘hazardous locations’
  - As described in R308.4
    - Acid etched, sand-blasted, ceramic-fired, laser etched, embossed, or a type that cannot be removed without destroying
  - 2 exceptions
    - One for ‘other than tempered glass’ – CEO approved certificate...
    - One for ‘spandrel glass’ – allows a removable paper label
- **R308.2 – Louvered windows or jalousies**
  - Minimum 3/16" thick, maximum 48" long
  - Exposed edges shall be smooth

- **R308.2.1 – Wired glass prohibited**
  - Wire exposed on longitudinal edges shall not be used in...

- **R308.3 – Human impact loads**
  - Individual glazed areas... shall pass test.
  - 3 exceptions
  - Louvered windows and jalousies comply with R308.2
  - Mirrors and glass panels with continuous backing support
  - Glass unit masonry per R607

- **R308.4 – Hazardous locations**
  - R308.4.1 – Glazing in doors
  - R308.4.2 – Glazing adjacent to doors
  - R308.4.3 – Glazing in Windows
  - R308.4.4 – Glazing in guards and railings
  - R308.4.5 – Glazing and wet surfaces
  - R308.4.6 – Glazing adjacent to stairs and ramps
  - R308.4.7 – Glazing adjacent to bottom stair landing
R308.4.1 – Glazing in doors
Exception 1 – 3" sphere unable to pass
Exception 2 – Decorative glazing

R308.4.2 – Glazing adjacent to doors
Bottom edge < 60" above and either
1. within 24" of door
2. perpendicular wall within
24" of hinge side of in-swing

R308.4.3 – Glazing in windows
Meeting all of the following
1. > 9 s.f. (A) and
2. bottom > 24" above (B) and
3. top > 36" above (C) and
4. walking surface within 36" (D)
Student exercise:
- Identify any locations where safety glazing may be required and note them on the review sheet
September 1, 2020

Tempered Glass

ETCHED INTO GLASS TO SHOW CONFORMITY FOUND IN BOTTOM CENTER OF GLASS U/S

BREKAGE PATTERN BROKEN IN MANY SECTIONS ALONG REGULAR PATH THROUGHOUT GLASS SITE ENDS LARGER THAN HINTS THAN AN ENDS REGULARLY

Laminated Safety Glass

GLASS VARIOUS THICKNESSES FYB INTERLAYER "SHEET" THICKNESSES

BREKAGE PATTERN "SHEET" OF GLASS STAYS TOTALLY IN DEFLECTION TO INTERLAYER

A Division of New York Department of State
Strengthened Glass

Heat Strengthened Glass
- Breakage pattern
  - Smaller, more controlled pieces
  - Glass pieces do not remain in tact in opening once breakage occurs

Chemically Strengthened Glass
- Breakage pattern
  - Smaller, more controlled pieces
  - Tinted glass
  - Easier to change than annealed glass

September 1, 2020

R309 – Garages and Carports
- R309.1 – Floor Surfaces
  - Approved noncombustible surface, sloped to drain liquid
- R309.2 – Carports
  - Open on at least 2 sides, exception for asphalt floor
- R309.3 – Flood Hazard Areas
  - Per Section R322
- R309.4 – Automatic Garage Door Openers
  - UL 325 compliant

September 1, 2020

R310 – Emergency Escape & Rescue Openings
- R310.1 – Emergency Escape & Rescue Openings Required
  - Basements, habitable attics, and every sleeping room shall have not less than one...
- R310.2 – Emergency Escape & Rescue Openings
  - Size and location details, below grade openings to meet the 5 square foot allowance
- R310.3 – Emergency Escape & Rescue Doors
  - Specific allowance for doors as EERO's.
- R310.4 – Bars, Grilles, Covers, and Screens
  - Allowable with conditions

September 1, 2020
Student exercise:

- Complete items 10 and 11 on the review sheet

Garages and Garports

Floor surface

Garports

Emergency Escape & Rescue Openings

- Elevators & rescue openings required
- Escapes & rescue openings
- Minimum opening area
- Doors - swing
- Doors - pull
- Ladders & stairs
- Escalators
- EER2D under decks & porches
- Entry, rescue & escape doors
- Minimum door opening size
- Hutch or enclosures
- Doors, grates, covers and screens

Approved noncombustible material, sloped
- Open on not less than 2 sides
- Exception allowed at ground level
- To or above design floor elevation or
- At or above grade on not less than 1 side

Listed and labeled per UL 323
- Rated design per Table R302 (1), burn a
Polling Question

Which of the following is true regarding Emergency Escape and Rescue Openings?

a) They are required from all sleeping rooms
b) They are a component of the means of egress
c) They are required from all habitable spaces
d) They are required from small basements less than 200 s.f.
### Student Exercise:
Check the proposal for compliance with R311

---

#### Means of Egress

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>311.1</td>
<td>Basement doors and entries</td>
</tr>
<tr>
<td>311.2</td>
<td>Outside doors</td>
</tr>
<tr>
<td>311.3</td>
<td>Floor plan of required access</td>
</tr>
<tr>
<td>311.4</td>
<td>Vertical access</td>
</tr>
</tbody>
</table>

#### Door #1
- Shown as 36" side hinged – OK
- 5 1/2" step down – OK
- Rear slider (#7)

#### Hallways
- Shown as 3' 11 1/2"

#### Stairways
- Main – 3' 1"
- Basement – 3' 6 1/2"

#### Risers
- Minimum 7 3/4" required
- Maximum 8 7/64" minimum

#### Treads
- 9" basement
- Not shown for main stairway
- Shown but no details

#### Light for bsmt stair
- Verify at inspection

#### N/A
- N/A
R312 – Guards and Window Fall Protection

R312.1 – Guards

R312.1.1 Where required
R312.1.2 Height
R312.1.3 Opening limitations
R312.1.4 Exterior plastic composite guards
R312.2 – Window Fall Protection
  R312.2.1 Window sills
  R312.2.2 Window opening control devices
Student Exercise:
Check the proposal for compliance with R312

Guards and Window Fall Protection

<table>
<thead>
<tr>
<th>Guards</th>
<th>Window Fall Protection</th>
<th>R312</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>Window Sites</td>
<td>R312.1</td>
</tr>
<tr>
<td>Opening</td>
<td>Window opening control devices</td>
<td>R312.2</td>
</tr>
</tbody>
</table>

Guards req'd for walkway and lift. Insufficient details provided.

Bedrooms #2 May require details not provided.

Open sided walking surfaces elevated >36") not less than 36". 2 exceptions for stairs.
2 Enc "6" at bottom rail to stairs.
4.5" along stairs at landings.

<4" above floor / 72" above grade.
Max 6" opening on ASTM F2050 device.
ASTM F2050 tested device.
### R313  Automatic Fire Sprinkler Systems
- **R313.1  Townhouse Automatic Fire Sprinkler System**
  - 3 stories above grade plane shall be equipped throughout
  - **R313.1.1** Design and installation per P2904 or NFPA 13D
- **R313.2  One- and Two-Family Dwellings Automatic Fire Sprinkler System**
  - 3 stories above grade plane shall be equipped throughout
  - **R313.2.1** Design and installation per P2904 or NFPA 13D

### R314  Smoke Alarms
- **[NY] R314.1  General** – Comply with NFPA 72 & R314
- **[NY] R314.2  Where required** – Shall be provided in dwelling units
  - **[NY] R314.2.2** – Smoke alarms in existing dwellings, per Appendix J
- **R314.3  Location** – In and near sleeping areas, every level
- **[NY] R314.4  Interconnection** – Required (unless no commercial power)
- **R314.5  Combination alarms** – Permitted
- **[NY] R314.6  Power source** – Hard wired with battery back-up
- **R314.7  Fire alarm systems** – Permitted with conditions

### R314  Smoke Alarms (continued)
- **[NY] R314.8  Portable smoke alarms in lodging houses**
  - In addition to other requirements
  - Minimum 1 per building
  - **[NY] R314.8.1** Sign advising of availability,
R315 Carbon Monoxide Alarms

- [NY] R315.1 General. Carbon monoxide alarms shall be provided in accordance with Section 915 of the 2020 Fire Code of NYS
  - (F) 915.2 New ResCode buildings; on each story containing a sleeping area and within 15’ of the sleeping area and each story with a CO source
    - For this section ‘new’ is anything constructed on or after January 1, 2008

Student Exercise:
Complete Section 14 of the review sheet
September 1, 2020

- **R317 – Protection of Wood and Wood Based Products Against Decay**
  - Naturally durable or preservative treated wood required in specified locations
    - Generally where in contact with or close proximity to
      - Concrete
      - Masonry
      - Earth
    - 7 specific locations listed

- **R318 Protection Against Subterranean Termites**
  - **R318.1 Subterranean termite control methods**
    - 1. Chemical treatment per R318.2
    - 2. Termite baiting installed and maintained per label directions
    - 3. Pressure-preservative-treated wood
    - 4. Naturally durable termite-resistant wood
    - 5. Physical barriers per R318.3 in locations per R317.1
    - 6. Cold-formed steel framing per R505.2.1 and R603.2.1
  - **R318.2 Chemical termiticide treatment**
  - **R318.3 Barriers**
  - **R318.4 Foam plastic protection**
Student Exercise:
Complete Section 15 of the review sheet

<table>
<thead>
<tr>
<th>Protection of Wood &amp; Wood Based Products Against Decay</th>
<th>R217</th>
<th>R217.1</th>
<th>R217.1.1</th>
<th>R217.1.2</th>
<th>R217.1.3</th>
<th>R217.1.4</th>
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<tr>
<td>Field treatment</td>
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<tr>
<td>Ground contact</td>
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<td>Geographical areas</td>
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<tr>
<td>Plastic composites</td>
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<td>Protection Against Termite</td>
<td>R218</td>
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</tr>
</tbody>
</table>

Naturally durable or preservative treated

Generally, in contact with or close to: Earth, concrete, or masonry. Seven specific locations: Field cut ends, notches, drilled holes of PT wood treated per AWPA E2

Ground contact or embedded in concrete – Use pressure-preservative-treated

Local conditions/experience

Naturally decay resistant or pressure-preservative-treated

Exceptions

Material specific fastener coverage

See R217.2

Six listed methods – Use any one or any combination

Vew at insp.

Not shown – Verify at insp.

PT sill plates

PT wall plates

Vew at insp.
• R322 Flood Resistant Construction
  • R322.1 General
    • [NY] R322.1.4 Establishing the design flood elevation
  • [NY] R322.2 Flood Hazard Areas (including A Zones)
  • R322.3 Coastal High-hazard Areas
    • (including V Zones and Coastal A zones, where designated)

Polling Question
Freeboard is what elevation above design flood elevation?

a) 1’
b) 1’ 6”
c) 2’
d) In accordance with the FIRM map

Student Exercise:
Complete Section 16 of the review sheet
Chapter 3 of the 2020 RCNYS is one of the most significant chapters in the document. It is the chapter that establishes what loads and forces will affect our building, and provides the minimum performance requirements for habitability, life safety and fire safety – it insures that the building will be a safe and suitable living environment for the occupants.
- Next:
- **Chapter 4 - Foundations**
Lesson 3
Foundations
RCNYS Chapter 4

Chapter 4 Table of Contents

R401 – General
R402 – Materials
R403 – Footings
R404 – Foundation and Retaining Walls
R405 – Foundation Drainage
R406 – Foundation Waterproofing and Dampproofing
R407 – Columns
R408 – Under-floor Space

R401.1 Application
– Use this chapter to design and construct
  • Foundations
  • Foundation spaces
– Wood foundations use
  • AWC Permanent Wood Foundation Design Specification.
  • Exception allows for use of ‘this chapter’ where:
    – No more than 2 floors
    – Walls at intervals not exceeding 50’
R401.2 Requirements
– Must carry all loads
– Transmit loads
– Be supported by proper soils

• R401.3 Drainage
  – Surface Drainage
    • to storm sewer or approved collection point
  – Final grade shall fall at least 6” within the first 10’
    • Exception allows swales away from building
    • Requires impervious surfaces within 10’ to slope away at 2%

R401.4 Soil Tests
– Expansive, compressible, shifting or questionable soils require testing
– R401.4.1 Geotechnical Evaluation
  • In lieu of a complete geotechnical evaluation, use Table R401.4.1 for load bearing values
Soil Investigation Methods

A test pit can offer an in-depth evaluation of the soil up to the depth of the pit.

Soil Investigation Methods

Boring can provide a deeper understanding of the soils.

<table>
<thead>
<tr>
<th>CLASS OF MATERIAL</th>
<th>LOAD-MAINTAINING ( \text{psi} ) FOUNDATION MATERIALS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(pounds per square foot)</td>
</tr>
<tr>
<td>Crystalline material</td>
<td>11,000</td>
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<tr>
<td>Bedrock and fractured rock</td>
<td>4,000</td>
</tr>
<tr>
<td>Sandy gravel and/or gravel (GW and GP)</td>
<td>9,000</td>
</tr>
<tr>
<td>Sand, silt, sand, clay, sand, gravel, and gravel (SW, SF, SC, SG, and CG)</td>
<td>2,000</td>
</tr>
<tr>
<td>Clay, sandy, silty clay, clayey silty soil, and sandy silt (CL, ML, SM, and CM)</td>
<td>3,500</td>
</tr>
</tbody>
</table>

Ex. No. 1 pound per square foot = 6,944KPa. The allowable bearing capacity of the soil shall be part of the engineering design.
Soil classification basics:
Soils are classified based on their composition (what material) and on their quality (how good)

<table>
<thead>
<tr>
<th>Composition</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>G = gravel</td>
<td>P = poorly graded (uniform particle sizes)</td>
</tr>
<tr>
<td>S = sand</td>
<td>W = well-graded (diversified particle sizes)</td>
</tr>
<tr>
<td>M = silt</td>
<td>H = high plasticity</td>
</tr>
<tr>
<td>C = clay</td>
<td>L = low plasticity</td>
</tr>
<tr>
<td>O = organic</td>
<td></td>
</tr>
</tbody>
</table>

Soil classification basics:
Soils are classified based on their composition (what material) and on their quality (how good)

GW = Gravel, well-graded
GP = Gravel, poorly graded
SW = Sand, well-graded
SP = Sand, poorly graded
SM = Sand with silt
SC = Sand with clay
GM = Gravel with silt
GC = Gravel with clay
CL = Clay, low plasticity
ML = Silt, low plasticity
MH = Silt, high plasticity
CH = Clay, high plasticity

R402 - Materials
R402.1 Wood Foundations
   - R402.1.1 Fasteners
   - R402.1.2 Wood treatment
R402.2 Concrete
   - Compressive strength
   - Air entrainment
     • See Table R402.2 (next slide)
R402.3 Pre-cast Concrete
R402.4 Masonry
Polling Question

The minimum compressive strength of a garage floor slab in Schoharie County is?

a) 2,500 psi
b) 3,500 psi
c) 4,000 psi
d) 4,500 psi

R403 Footings

- R403.1 General
  All exterior walls shall be supported by
  - Continuous masonry or concrete footings
  - Crushed Stone footings
  - Wood Foundations
  - Other approved structural systems
  Sized based on the soil characteristics
  On undisturbed soil or engineered fill
  In accordance with R403 or ACI 332
**R403.1.1 Minimum Size**
- Spread footings
  - Minimum 6" thick
- Width (W)
  - Tables R403.1(1), (2), (3)
- Projection (P)
  - Minimum = 2"
  - Maximum = thickness of footing
- Pier footing size
  - Based on tributary loads

**R403.1.4 Minimum Depth**
- Exterior footings... not less than 12” below grade
- Where applicable see...
  - R403.1.4.1 Frost Protection
    - 4 listed methods
    - 3 listed exceptions
- Shall not bear on frozen soil unless permafrost
<table>
<thead>
<tr>
<th>Item</th>
<th>Code Section</th>
<th>Required / Allowed</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations</td>
<td>R401.4</td>
<td>Pre-existing value</td>
<td>Presumptive OK</td>
</tr>
<tr>
<td></td>
<td>R422</td>
<td>Compensatory soil</td>
<td>SC soils, 2,000 psf</td>
</tr>
<tr>
<td></td>
<td>R402.1</td>
<td>Materials</td>
<td>Not shown</td>
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<tr>
<td></td>
<td>R402.2</td>
<td>Block</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R402.3</td>
<td>Concrete</td>
<td></td>
</tr>
</tbody>
</table>

For every 2 feet of adjustment to the width of the house, add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

**Concrete footing**

<table>
<thead>
<tr>
<th>Item</th>
<th>Code Section</th>
<th>Required / Allowed</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footings</td>
<td>R403.1</td>
<td>General</td>
<td>NC 22</td>
</tr>
<tr>
<td></td>
<td>R403.2</td>
<td>Maximum size</td>
<td>R403.2.1.10</td>
</tr>
<tr>
<td></td>
<td>R403.3</td>
<td>Footing</td>
<td>R403.3.10</td>
</tr>
<tr>
<td></td>
<td>R403.4</td>
<td>Concrete</td>
<td>R403.4.10</td>
</tr>
</tbody>
</table>

**Minimum Wide and Depth for Concrete Footing**

<table>
<thead>
<tr>
<th>Footing</th>
<th>Width (in)</th>
<th>Depth (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 story — slab on grade</td>
<td>12 x 6</td>
<td>12 x 6</td>
</tr>
<tr>
<td>2 story — slab on grade</td>
<td>15 x 6</td>
<td>17 x 6</td>
</tr>
<tr>
<td>3 story — slab on grade</td>
<td>15 x 6</td>
<td>17 x 6</td>
</tr>
<tr>
<td>4 story — slab on grade</td>
<td>15 x 6</td>
<td>17 x 6</td>
</tr>
</tbody>
</table>

*Based on 12-foot-wide house with load-bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house, add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).
### Table 403.1(2)
Minimum width and thickness for light frame construction with Brick Veneer

<table>
<thead>
<tr>
<th>Location</th>
<th>Minimum Width</th>
<th>Minimum Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-story—thin-plate</td>
<td>12 x 6</td>
<td>12 x 6</td>
</tr>
<tr>
<td>1-story—thin-skin</td>
<td>14 x 6</td>
<td>14 x 6</td>
</tr>
<tr>
<td>1-story—light-frame</td>
<td>16 x 6</td>
<td>16 x 6</td>
</tr>
<tr>
<td>2-story—thin-plate</td>
<td>18 x 6</td>
<td>18 x 6</td>
</tr>
<tr>
<td>2-story—thin-skin</td>
<td>20 x 6</td>
<td>20 x 6</td>
</tr>
<tr>
<td>2-story—light-frame</td>
<td>22 x 6</td>
<td>22 x 6</td>
</tr>
</tbody>
</table>

*Note: Minimum projection factor 2" but shall not exceed thickness from Table R301.2(1).*
R404 Foundation and Retaining Walls

- R404.1 - For Concrete use R404.1.3, For Masonry R404.1.2
- Both R404.1.2 and R404.1.3 provide for either engineered design or prescriptive provisions of the 2020 RCNYS

R404.1.3.2 Reinforcement for foundation walls

- Horizontal per Table R404.1.2(1)
- Vertical per Tables R404.1.2(2) through (8)

R404.1.5 Foundation Wall Thickness

- Based on Walls Supported
  - R404.1.5.2 Concrete Wall Thickness
    - Equal to or greater than the wall above
  - R404.1.6 Height Above Finished Grade
    - 4" if masonry veneer, 6" elsewhere
  - R404.1.7 Backfill Placement
    - Sufficient strength, anchored or braced
### Foundation and Retaining Walls

<table>
<thead>
<tr>
<th>Item</th>
<th>Code/Section 1</th>
<th>Code/Section 2</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design required</strong></td>
<td>R04.1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prescriptive allowed where laterally supported at top and bottom of wall</strong></td>
<td>R04.1.2, 2020</td>
<td>R04.1.1(14)</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Concrete foundation walls</strong></td>
<td>R04.1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reinforcement</strong></td>
<td>R04.1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vertical</strong></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Alternate sizes/grades of re-bar</strong></td>
<td>R04.4.1(2D)</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Height above finished grade</strong></td>
<td>R04.1.6</td>
<td></td>
<td>Verify at inspection</td>
</tr>
<tr>
<td><strong>Backfill placement</strong></td>
<td>R04.1.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Wood Foundation Walls

<table>
<thead>
<tr>
<th>Item</th>
<th>Code/Section 1</th>
<th>Code/Section 2</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wood foundation walls</strong></td>
<td>R04.2, 2.1, exc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wood sill plates</strong></td>
<td>R04.3</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Retaining walls</strong></td>
<td>R04.4</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Precast concrete foundation walls</strong></td>
<td>R04.5</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Foundation drainage</strong></td>
<td>R405, 1, except</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Foundation waterproofing and draining</strong></td>
<td>R406, 1, except</td>
<td>R406.1, 2.2</td>
<td></td>
</tr>
<tr>
<td><strong>Columns</strong></td>
<td>R407, 2.2</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Under-floor space (concealed)</strong></td>
<td>R408, 1</td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Foundation and Waterproofing

<table>
<thead>
<tr>
<th>Item</th>
<th>Code/Section</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foundation walls</strong></td>
<td>R04.1.1</td>
<td></td>
</tr>
<tr>
<td><strong>Foundation waterproofing and draining</strong></td>
<td>R406, 1, 2.2</td>
<td></td>
</tr>
<tr>
<td><strong>Columns</strong></td>
<td>R407, 2.2</td>
<td></td>
</tr>
<tr>
<td><strong>Under-floor space (concealed)</strong></td>
<td>R408, 1</td>
<td></td>
</tr>
</tbody>
</table>

- **Foundation walls, Check the details Appendix page **
- **Basic Training**

---

### SC Soils – OK

- 6’ +/- 7’
- N/A
- Not shown

### Vertical

- N/A
- +/- 12”
- Verify at inspection

### Wood Foundation walls

- Not Shown

---

### N/A

- N/A
- N/A

---

### Foundation

- Shown, Verify at inspection
- Foundation notes 17 & 18
- OK

### Steel Posts

- 11 Gauge steel posts, OK
- N/A
### Table R404.1.2(3) (top portion)
- **8” wall thickness, no reinforcement shown, SC soils**

<table>
<thead>
<tr>
<th>Maximum Unsupported Wall Height (ft)</th>
<th>Maximum Unbalanced Soil Pressure (psf)</th>
<th>Soil (Type)</th>
<th>Reinforcement</th>
<th>Minimum Vertical Reinforcement (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>100</td>
<td>SC</td>
<td>NR</td>
<td>@ 41</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>SC</td>
<td>@ 37</td>
<td></td>
</tr>
</tbody>
</table>

### Table R404.1.2(4) (top portion)
- **10” wall thickness, no reinforcement shown, SC soils**

<table>
<thead>
<tr>
<th>Maximum Unsupported Wall Height (ft)</th>
<th>Maximum Unbalanced Soil Pressure (psf)</th>
<th>Soil (Type)</th>
<th>Reinforcement</th>
<th>Minimum Vertical Reinforcement (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>100</td>
<td>SC</td>
<td>NR</td>
<td>@ 41</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>SC</td>
<td>@ 37</td>
<td></td>
</tr>
</tbody>
</table>

### Table R404.1.2(5)
- **12” wall thickness, no reinforcement shown, SC soils**

<table>
<thead>
<tr>
<th>Maximum Unsupported Wall Height (ft)</th>
<th>Maximum Unbalanced Soil Pressure (psf)</th>
<th>Soil (Type)</th>
<th>Reinforcement</th>
<th>Minimum Vertical Reinforcement (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>100</td>
<td>SC</td>
<td>NR</td>
<td>@ 41</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>SC</td>
<td>@ 37</td>
<td></td>
</tr>
</tbody>
</table>
Polling Question

The minimum size and maximum spacing of vertical reinforcement for a 10” masonry wall is found in which table?

a) Table R404.1.1(1)  
b) Table R404.1.2(4)  
c) Table R404.1.1(3)  
d) Table R404.1.1(4)

R405  Foundation Drainage

- R405.1  Concrete or masonry foundations require drains around the outside
  - Exception for well drained ground or sand-gravel mix soils – Group 1 soils per Table R405.1

16. Foundation Drainage required on all foundations in high ground water areas:
   A. Gravel must be 12” beyond exterior of foundation
   B. Gravel must be 6” above top of footings
   C. 6 mil. Poly required under slab
R406 Foundation Waterproofing and Dampproofing

R406.1 Concrete and Masonry Foundation Dampproofing

Except where required by R406.2…

5 listed methods to dampproof

R406.2 Concrete and Masonry Foundation Waterproofing

In areas where a high water table or other severe soil-water conditions are known to exist…

8 listed methods to waterproof

R407 Columns

– R407.1 Wood Column Protection
  • Protect against decay per R317

– R407.2 Steel Column Protection
  • Shop coated with paint or other protective coating

– R407.3 Structural Requirements
  • Restrained at bottom to prevent lateral displacement
  • Wood, minimum 4 x 4 nominal
  • Steel, 3” diameter, schedule 40 or approved equivalent
**Features**

- Fully assembled, self-contained unit
- Constructed of high carbon, heavy duty steel
- Finished with corrosion-resistant powder (exceeds ASTM-B117-85)
- Available in adjustable lengths up to 12’
- Poured concrete locks post adjustment permanently

**Basic Training**

<table>
<thead>
<tr>
<th>NEA</th>
<th>N/A</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Shown</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Foundation notes 17 & 18**

- OK
- 11 Gauge steel posts, OK
- Shown, Verify at Inspection
- 11 Gauge steel posts, OK

**September 1, 2020**

**Let's do some inspections...**

- First footings and form work
- Then walls, drainage, backfill
- The good, the bad, and the ugly...
Footing Inspection

As you enter site remember to check:
• For copy of prints on site
• Footed building permit
• Setback distances
• Topography of site
• Soil conditions on site

Setting the forms

• Forms must be set on undisturbed soil
• Must be sized as shown on prints
• Footings must be set at the proper elevation
• Footing top surface must be level
• Bottom of footing must have square edges
• Bottom of footings must be within 10 degrees of level or stepped footings will be required

Check for:
• Proper footing width
• Proper footing depth
• Reinforcing bar size
• Reinforcing bar placement
Remember the details on the foundation plan?

How deep should the column footings be?

Is that what is being installed?

42” X 42” seems OK...
What about the thickness?
Plan says 21” thick.

The plans did not show a ‘stepped’ footing, though the initial review revealed this possibility on Sheet A3.04 at Section B.

Lacking a prescriptive solution in the RC, ‘design’ will be required.
Among the possible issues:
- Minimum concrete cover for re-bar
- Continuity of footing at step
- Possible ‘cold joint’ at bottom of step

(what’s holding the re-bar up in the lower section?)

---

Foundation Plan Note #8 - Provide keyway or 12" #4 dowels at 36" o.c.

Is the dowel spacing correct now?
Long story short – The poorly installed step footing, etc. resulted in the original footing being removed and replaced. To eliminate the step the garage footing was lowered to match the rest of the house.

Some problems become obvious after the forms come off...

Re-bar was too close to the form
Concrete was not properly consolidated
Minimum footing thickness?
Depth of re-bar embedded in concrete?
Location of re-bar within line of wall?

Remember that poorly done 'step footing'...
How much load will that accommodate?

Foundation walls
Prep / Place
Remove forms
Dampproofing/waterproofing
Foundation drainage
Backfill
Corner left open for inspection.
Check re-bar placement if it was required
Are the dowels in the right location?
Dirt on top of footing?

Are these forms properly braced?

Once the concrete has achieved adequate strength forms can be removed
Foundations often include beam pockets. Are they properly sized? Is there enough concrete behind the beam?

Did the walls end up in the right place? What's the projection factor? Dampproofing in progress Where is it needed?

Did the dirt fall before or after the Dampproofing was applied? Check it!

September 1, 2020
A Division of New York Department of State

Inspection pics
Is this OK?
Where is Dampproofing or waterproofing required?
Where can it be omitted?

Ready to install foundation drain.
What about the debris at the far end?
Compare this to R405 Foundation Drainage
And to R404.1.7 Backfill Placement

Anchor bolt placement, spacing, location.
How far from the ends?
How far in between?

What could go wrong?
Sometimes there are no easy fixes...
Example of a cold joint
Backfill caused left section of wall to push back

Top view of same cold joint

 Homemade forms might be OK...
Homemade forms might be OK...
If they’re filled correctly

Homemade forms might be OK...
If they’re assembled well

Homemade forms might be OK...
If they don’t blow out
Homemade forms might be OK...
If they don’t blow out

The contractor couldn’t understand why his foundation inspection failed...
Even a thorough plan review and good inspections will not guarantee a job well done.

Overall the plan provides most of the detail we need to see, though several items do not meet prescriptive requirements. The Design Professional will need to fill in a few blanks once he/she is advised of the deficiencies.

Next floors in Chapter 5
Lesson 4
Floors
RCNYS Chapter 5

Chapter 5 – Floors
– R501 – General
– R502 – Wood Floor Framing
– R503 – Floor Sheathing
– R506 – Concrete Floors (On Ground)
– R507 – Exterior Decks

R501 – General
– R501.1 – Application
  • Shall control design and construction of floors
  -- Including attic spaces used to house mechanical or plumbing fixtures and equipment
– R501.2 – Requirements
  • Capable of accommodating all loads per R301
  -- Transmitting loads to supporting structural elements
R502 – Wood Floor Framing

– R502.1 – General. Wood and wood-based products shall conform to this section
  • [NY] R502.1.1 – Sawn Lumber. Shall be identified by a grade mark
    – [NY] Exception for ungraded lumber
      » Must be sold directly to consumer or their contractor
      » Mill to certify grade 2 or better per DOC PS 20
R502.2 – Design and Construction
– Shall be in accordance with
  • This chapter
  • Figure R502.2
  • Sections 317 & 318
  – Decay and Termites
  • Or ANSI AWC NDS
R502.3 – Allowable Joist Spans

- R502.3.1 Sleeping areas and attic joists
  • Table R502.3.1(1)
    - 30 psf live load
- R502.3.2 Other floor joists
  • Table R502.3.1(2)
    - 40 psf live load

Polling Question

What is the allowable joist span for a second story bedroom using 2 x 6 Spruce-pine-fir, grade 2 at 16” on center with a dead load of 10 psf?

a) 11’ 3”
b) 10’ 3”
c) 9’ 8”
d) 8’ 11”
Appendix Page 3

Joist Span Exercise 1 -
Given: Sleeping area
Appropriate table?
2 x 6, Spruce-pine-fir, grade #2 at 16” o.c.
Dead load 10 psf
Allowable Span?

Appendix Page 3

Joist Span Exercise 2 -
Given: Living room, dining room, family room
Appropriate table?
2 x 10, Hem-Fir, grade #2 at 24” o.c. Dead load 10 psf
Allowable Span?
**R502.4 Joists Under Bearing Partitions**

If framed for pipe or duct passage must be solid blocked 4’o.c.

Joists under bearing partitions must be sized to support loads
R502.5 Allowable Girder & Header Spans
Girders constructed of dimensional lumber shall not exceed values in tables
- R602.7(1)
  - Girder and Header Spans for Exterior Bearing Walls
- R602.7(2)
  - Girder and Header Spans for Interior Bearing Walls
- R602.7(3)
  - Girder and Header Spans for Open Porches

Supporting one floor only

Supporting two floors
Appendix Page 3

Proposed 2-story home, Ground snow load 50 psf
Building width 28’, Interior girder shown, Supports 2 floors
Check girder span for compliance

4 – 2 X 10 nailed per Table R602.3(1), item 27. Column spacing 8’ o.c.

Page 176

As proposed the girder does not meet
The prescriptive table.
Proposed girder span is over 7’ clear
Table would only allow between 6’ 4” and 5’ 3”

R502.6 Bearing
• Minimum 1 1/2” when on wood or metal
• Minimum 3” when on masonry or concrete
  – R502.6.1 – Floor systems
  • 3” overlap at girders or use splice plate
  – R502.6.2 – Joist framing
  • Into side of girder use hangers or ledger
R502.6 Bearing

For SI: 1 in = 25.4 mm

Floors Joint Bearing on Masonry

R502.6.1 Floor Systems

Minimum 3" overlap or...

Splice Plate

R502.6.2 Joist Framing

For SI: 1 in = 25.4 mm
Polling Question
What is the minimum allowable bearing for a wood joist on a wood sill plate?

a) 1 1/2"
b) 2"
c) 2 1/2"
d) 3"

R502.7 Lateral Restraint at Supports
- Joists restrained at ends to prevent rotation
  - Exception for 'engineered' wood products
    » Per manufacturers specifications
  - Exception for seismic D3 or worse
- R502.7.1 Bridging
  - Joists larger than 2 x 12 require bridging every 8'
    » Exception for 'engineered' wood products
      » Per manufacturers specifications

Basic Training 9E - The Residential Code
R502.8 Cutting, Drilling, Notching

- See figure R502.8
  - R502.8.1 Sawn lumber
    - Maximum 1/6 the depth,
    - No longer than 1/3 the depth
    - Not in middle 1/3 of span
    - End notches, bored holes...
  - R502.8.2 Engineered wood products
    - Per manufacturer

**FIGURE R502.8**

CUTTING, NOTCHING AND DRILLING
R502.9 Fastening

- Nailed per Table R602.3(1)
- Posts and beam/girder supporting floor framing require positive connections to resist uplift and lateral movement
### TABLE R02-3(1)—continued
### FASTENING SCHEDULE

<table>
<thead>
<tr>
<th>Floor</th>
<th>Joint to sill, top plate or girder</th>
<th>Torx nail</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>3-8d hex (3/16 x 0.25&quot;), 3-10d hex (3/16 x 0.35&quot;), or 5-10d hex (1/2 x 0.35&quot;)</td>
<td>Torx nail</td>
</tr>
<tr>
<td>22</td>
<td>Run joint, head joint or blocking to sill or top plate (not apparent side)</td>
<td>6d hex (3/16 x 0.15&quot;)</td>
</tr>
<tr>
<td>23</td>
<td>2&quot; x 6&quot; subfloor or less to each joint</td>
<td>6d hex (3/16 x 0.15&quot;)</td>
</tr>
</tbody>
</table>

---

| 24 | 2" subfloor to joist or girder | 3-14d hex (3/4 x 0.45") or 2-14d common (3/4 x 0.45") | Blind nail toe nail |
| 25 | Glulam (glued laminated wood—floor & wall) | 3-14d common (3/4 x 0.45") or 3-14d common (3/4 x 0.45") | At each beam, face nail |
| 26 | Bond or rim joint to joint | 4-10d hex (3/16 x 0.20") or 4-10d hex (3/16 x 0.20") | End nail |
| 27 | Bond top joist and beams. 2 inch bearing layers | 2-14d common (1 1/2 x 0.35") or 3-14d common (1 1/2 x 0.35") | Nail each layer to follow. 32" o.c. at top and bottom and staggered on opposite sides |
|      | Bond top joist and beams. 2 inch bearing layers | 2-14d common (1 1/2 x 0.35") or 3-14d common (1 1/2 x 0.35") | Face nail at ends and at each splice |
| 28 | Ledges, clip supporting joists or columns | 4-14d hex (5/8 x 0.50") or 3-16d hex (5/8 x 0.50") or 6-14d hex (5/8 x 0.50") | At each joint in column. Face nail |

---

### Second section of the table continued:

| 29 | 1" x 1" | 2-14d common (5/8 x 0.25") or 2-14d common (5/8 x 0.25") | Blind nail toe nail |
| 30 | 3/4" x 3/4" | 2-14d common (5/8 x 0.25") or 2-14d common (5/8 x 0.25") | Blind nail toe nail |
| 31 | 3/4" x 3/4" | 3-14d common (5/8 x 0.25") or 3-14d common (5/8 x 0.25") | Blind nail toe nail |
| 32 | Obscure nail | Can be used for both exterior and interior nails |
| 33 | 1/4" spacement | Can be used for both exterior and interior nails |
| 34 | 1/4" spacement | Can be used for both exterior and interior nails |
| 35 | 1/4" spacement | Can be used for both exterior and interior nails |
| 36 | 1/4" spacement | Can be used for both exterior and interior nails |
| 37 | Second section continues |
| 38 | Second section continues |
| 39 | Second section continues |
R502.10 Framing of Openings

- Header and trimmer joists
  - ≤ 4' single header OK, same depth as joist
  - Single trimmer OK within 3' of bearing
  - Where header span > 4', double both
R502.12 Draftstopping required
• Per R302.12
  – Concealed combustible spaces in floors must be limited to 1,000 s.f. or less
  » Examples: Drop ceilings and wood floor trusses
  » R302.12.1 Materials
  • 1/2" GWB, 3/8" panel, other approved materials
  • Parallel to framing
Polling Question

Header and trimmer joists shall be doubled when?

a) The floor opening is 4’ or less in width
b) Header joists are always required to be doubled
c) The floor opening has an aspect ratio greater that 4 to 1
d) The floor opening is more than 4’ in width

R503 Floor Sheathing

–R503.1 Lumber sheathing
–R503.2 Wood structural panel sheathing
–R503.3 Particle board

R503.2 Wood Structural Panel Sheathing

–R503.2.1 Identification and grade
  • Conform to
    –DOC PS 1, DOC PS 2, CSA O437, or CSA O325
  • Grade mark or certificate of inspection
    –Grade,
    –Bond class &
    –Performance category
R506  Concrete Floors (on Ground)

- 3.5" minimum slab thickness
  - IF "expansive" soil - R403.1.8 (Comply with Building Code Section 1805.8)
- Compressive strength - R402.2
- 2,500 psi minimum for interior slabs
- 4" base course if slab is below grade
- Vapor retarder between slab and base
- Reinforcement support
First Floor Framing Reading the Plans

NON-Prescriptive framing

Engineered Lumber
- Follow manufacturer's instructions
- TJI TrusJoist floor and ceiling joists
- Microllam LVL beams and girders

First Floor Framing

Materials - Joists

<table>
<thead>
<tr>
<th>Joist And Beam List</th>
<th>Unit Qty</th>
<th>B of Net Qty</th>
<th>Length Product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
</tbody>
</table>

Joist identifier for location

First Floor Framing

Materials - Girders

<table>
<thead>
<tr>
<th>Joist And Beam List</th>
<th>Unit Qty</th>
<th>B of Net Qty</th>
<th>Length Product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2/3 x 9 1/2&quot;</td>
</tr>
</tbody>
</table>
Student exercise:
Using the Foundation plan, Sheet A-1 and Chapter 5 of the RCNYS
Complete checklist item # 8 on Form # 3W
<table>
<thead>
<tr>
<th>Pressure Preservation-Treated Wood Floors (On Ground)</th>
<th>Reinforcement support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>Reinforcement support</td>
</tr>
<tr>
<td>Concrete floors (on ground)</td>
<td>Reinforcement support</td>
</tr>
<tr>
<td>General</td>
<td>Reinforcement support</td>
</tr>
<tr>
<td>Site preparation</td>
<td>Reinforcement support</td>
</tr>
<tr>
<td>Base</td>
<td>Reinforcement support</td>
</tr>
<tr>
<td>Upper level</td>
<td>Reinforcement support</td>
</tr>
<tr>
<td>Reinforcement support</td>
<td>Reinforcement support</td>
</tr>
</tbody>
</table>

**Main basement note from Foundation plan, Sheet A-1**

- **4" concrete slab on 4" minimum compacted granular fill**

**Garage slab note from Foundation plan, Sheet A-1**

- **Unexcavated**

**Reinforcement support**

- Image of reinforcement support
**R507 Exterior Decks**

R507.1 Decks  
R507.2 Materials  
R507.3 Footings  
R507.4 Deck posts  
R507.5 Deck beams  
R507.6 Deck joists  
R507.7 Decking  
R507.8 Deck Vertical and lateral supports  
R507.9 Vertical and lateral supports at band joist

---

**R507.3 Footings.**  
Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads in accordance with Section R301. Deck footings shall be sized to carry the imposed loads from the deck structure to the ground as shown in Figure R507.3. The footing depth shall be in accordance with Section R403.1.4.  

*Exception: Free-standing decks consisting of posts directly supported on grade over their entire length.*

---

**R507.3.1 Minimum size.**  
The minimum size of concrete footings shall be in accordance with Table R507.3.1, based on the tributary area and allowable soil-bearing pressure in accordance with Table R401.4.1.

---

**Figure R507.3**

Deck Posts to Deck Foundation Connection
Polling Question

The minimum diameter and thickness of a round footing for a deck with a ground snow load of 50 psf and a tributary area of 80 sf, bearing on 2,000 psf soils is?

a) 19” x 6”
b) 21” x 8”
c) 24” x 8”
d) 21” x 6”

Exceptions:

1. Free-standing decks that meet all of the following criteria:
   1.1. The posts bear directly on precast concrete pier blocks at grade without support by beams or piers.
   1.2. The area of the deck does not exceed 200 square feet (18.9 m²).
   1.3. The walking surface is not more than 20 inches (516 mm) above grade at any point within 36 inches (914 mm) measured horizontally from the edge.
2. Free-standing decks need not be provided with footings that extend below the frost line.
R507.4 Deck posts
ONLY for single level decks
No stacked decks
Posts sized per Table R507.4 for
maximum height based on girth
Beams sized per Table R507.5
R507.5 Deck joists

Figure R507.6 and Table R507.6

Cantilever ≤ 1/4 actual joist span
TABLE R507-4
DECK JOINT SPANS FOR COMMON LUMBER SPECIES (\(\text{in.} \times \text{in.}\))

<table>
<thead>
<tr>
<th>SPACINGS OF DECK JOINTS</th>
<th>MAXIMUM CANTILEVER OF DECK JOINTS WITH</th>
<th>MAXIMUM JOINT SPACING</th>
<th>ALLOWABLE JOINT SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Wood shall be of a grade with a service factor not less than 0.85.
- The service factor is defined as the ratio of the allowable stress to the yield stress of the material.
- The allowable stress is the maximum stress that the material can withstand without failing.
- The yield stress is the stress at which the material begins to deform permanently.

Revised: September 1, 2020

R507.7 Decking.
Maximum allowable spacing for joints supporting decking shall be in accordance with Table R507.7. Wood decking shall be attached to each supporting member with not less than two 3d threaded nails or two No. 8 wood screws. Other approved decking or fastener systems shall be installed in accordance with the manufacturer's installation requirements.
R507.8 Vertical and lateral supports
Where supported by dwelling,
Positively attached
NOT with toenails or
nails ‘subject to withdrawal’
Connection must be visible for inspection
Cantilevers designed for full live load on
cantilevered portion
TABLE R607.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

<table>
<thead>
<tr>
<th>MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS</th>
<th>TOP EDGE</th>
<th>BOTTOM EDGE</th>
<th>ENDS</th>
<th>ROW SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ledger</td>
<td>2 inches</td>
<td>5 inches</td>
<td>2 inches</td>
<td>1(\frac{1}{8}) inches</td>
</tr>
<tr>
<td>Band Joint</td>
<td>2 inches</td>
<td>5 inches</td>
<td>2 inches</td>
<td>1(\frac{1}{8}) inches</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R607.9.1.3(1).

b. Maximum 5 inches.

c. For engineered joints, the manufacturer’s recommendations shall govern.

d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R607.9.1.3(1).

---

FIGURE R607.9.1.3(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

---

FIGURE R607.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS

---
R09.7.2 Lateral connection.
Lateral loads shall be transferred to the ground or to a structure capable of transmitting them to the ground. Where the lateral load connection is provided in accordance with Figure R09.7.2(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches (610 mm) of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds (6672 N). Where the lateral load connections are provided in accordance with Figure R09.7.2(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).
Polling Question

Lag bolts placed in accordance with figure R507.9.1.3(1) provide what type of support for an attached exterior deck?

a) Vertical
b) Lateral
c) Both a and b above
d) Neither a nor b above
All framing will be inspected at the end of Lesson 7, Roof-Ceiling Construction

The 2020 RCNYS provides prescriptive methods to help insure that the floor systems, both interior and exterior, can safely perform their intended functions.

Any questions?
Next: Walls in Chapter 6
Lesson 5
Wall Construction
2020 RCNYS Chapter 6

Wind Basics

Reactions

UPLIFT
OVERTURNING
SLIDING
SHEAR
Chapter 6 – Wall Construction

R601  General
R602  Wood wall framing
R604  Wood structural panels

R601 – General
This chapter shall control design and construction
Wall(s) shall be capable of supporting all loads

R601.2.1 Compressible floor-covering
Shall not extend beneath walls, partitions or columns

[NY] R602.1.1 Sawn lumber.
– Shall be identified by a grade mark per
  DOC PS 20
  [NY] Exception for ungraded lumber
  Sold to end user
  Certificate from sawyer
  Equal to or better than grade # 2
R602.1.8 – Wood Structural Panels
Shall conform to DOC PS 1 or DOC PS 2
If from Canada, CSA O437 or CSA O325
Identified for:
Grade
Bond classification
Performance category
via a grade mark or certificate

R602.2 – Grade
Studs shall be a minimum # 3, Standard, or Stud grade lumber
Exception: Not supporting floors and non-bearing permitted to be utility grade

R602.3 – Design and Construction
Exterior walls per this chapter and Figures R602.3(1) and R602.3(2) or AWC NDS
Components fastened per Tables R602.3(1) through R602.3(4)
Exterior sheathing to resist wind pressures
Studs shall be continuous from sole to top plate
Exception: Jack, trimmer, and cripple studs
Figure R602.3(1)
Depicts code provisions for wood frame systems

Figure R602.3(2)
Provides additional framing details for wood frame construction (page 171)

TABLE R602.3(1)
FASTEEN SCREWS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION OF BUILDING ELEMENTS</th>
<th>NUMBER AND TYPE OF FASTENER</th>
<th>SPACING AND LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blocking between ceiling joists or columns to top plate</td>
<td>4-8d box (2&quot;) = 0.215&quot;) or 5/8&quot; round (1&quot;) = 0.37&quot;) or 5/8&quot; box (1&quot;) = 0.37&quot;) or 6-32x0.375&quot;)</td>
<td>Top out</td>
</tr>
<tr>
<td>2</td>
<td>Ceiling joist to top plate</td>
<td>4-8d box (2&quot;) = 0.215&quot;) or 5/8&quot; round (1&quot;) = 0.37&quot;) or 5/8&quot; box (1&quot;) = 0.37&quot;) or 6-32x0.375&quot;)</td>
<td>Peen (nail), top nail</td>
</tr>
<tr>
<td>3</td>
<td>Ceiling plate attached to parallel rafters, top and over partitions (see Section R602.3.2 and Table R602.3.2)</td>
<td>6-32x0.375&quot;) or 6-32x0.8&quot;) or 6-32x0.9&quot;) or 6-32x0.9&quot;)</td>
<td>Face nail</td>
</tr>
<tr>
<td>4</td>
<td>Ceiling plate attached to parallel rafters (see Section R602.3.2 and Table R602.3.2)</td>
<td>Table R602.3.2</td>
<td>Face nail</td>
</tr>
</tbody>
</table>
Polling Question

Using Table R602.3(1), what is an allowable connection for a top or bottom plate, end nailed?

a) 4 – 8d Box nails
b) 4 – 8d Common nails
c) 3 – 16d Box nails
d) 4 – 10d Box nails

Examples:

- Using table (1) find these examples
- 1 - Top or bottom plate to stud, end nail
- 2 - Built-up header, two pieces with ½" spacer
- 3 - Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)
### 16 Top or bottom plate to stud

- 4-80 box (2" x 0.25") or
- 3-80 box (2" x 0.215") or
- 4-80 common (2" x 0.215") or
- 4-80 box (1 1/2" x 0.25") or
- 3-80 box (1 1/2" x 0.215") or
- 3-5/8" x 0.165" nails

- 5-80 box (2" x 0.215") or
- 3-80 common (2" x 0.215") or
- 3-80 box (1 1/2" x 0.215") or
- 3-5/8" x 0.165" nails

### 17 Build-up leader (2" to 2" leader with 1/2" spacer)

| 16d common (2" x 0.102") | 10" o.c. each edge face nail |
| 16d box (2" x 0.125") | 12" o.c. each edge face nail |

### 18 Stud at stud (at or near wall panels)

- 16d common (2" x 0.102") | 24" o.c. for stilt |
- 16d box (2" x 0.125") | 16" o.c. for stilt |

- 16d box (2" x 0.125") | 12" o.c. for stilt |
- 16d common (2" x 0.102") | 16" o.c. for stilt |
TABLE R602.3(1)

<table>
<thead>
<tr>
<th>Minimum Rake</th>
<th>Minimum Wood Structural Panel Thickness (inches)</th>
<th>Minimum Nail Panel Thickness (inches)</th>
<th>Minimum Wall Nail Spacing (inches)</th>
<th>Minimum Door Spacing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30° Corrugated</td>
<td>0.040</td>
<td>0.070</td>
<td>0.096</td>
<td>0.120</td>
</tr>
<tr>
<td>24° Corrugated</td>
<td>0.040</td>
<td>0.070</td>
<td>0.096</td>
<td>0.120</td>
</tr>
</tbody>
</table>

For 30°, 24°, and 14° corrugated, one inch per hour = 0.040 in.

Table is based on 24° corrugated. See Table R602.3(2) for 30° and 14° corrugated. See Table R602.3(3) for 22° corrugated. See Table R602.3(4) for 18° corrugated.

R602.3.1 – Stud Size, Height and Spacing

- Per Table R602.3(5)

  • Exceptions:
    - Utility grade with limits
    - Light snow and wind loads
    - Exterior load bearing studs not exceeding 12’ in height... Table 602.3(6)

TABLE R602.3(5)

<table>
<thead>
<tr>
<th>Stud Size (inches)</th>
<th>Maximum spacing when supporting floor or roof (inches)</th>
<th>Minimum spacing when supporting floor or roof (inches)</th>
<th>Maximum spacing when supporting floor or roof (inches)</th>
<th>Minimum spacing when supporting floor or roof (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 3</td>
<td>30</td>
<td>18</td>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>2 x 4</td>
<td>24</td>
<td>12</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>2 x 6</td>
<td>24</td>
<td>12</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>2 x 8</td>
<td>24</td>
<td>12</td>
<td>24</td>
<td>12</td>
</tr>
</tbody>
</table>

For 2 x 6, 2 x 8, and 2 x 10, use the next larger studs by 3/8 inch. See Table 602.3(6) for 2 x 2 and 2 x 4 studs.

Note:
- Studs are based on 24° corrugated. See Table R602.3(2) for 30° and Table R602.3(3) for 14° corrugated.
- See Table R602.3(4) for 22° corrugated and Table R602.3(5) for 18° corrugated.
R602.3.2 – Top plate
• Generally doubled
  – Exception allows single in 3 cases

R602.3.3 – Bearing studs
• Within 5” of rafters if rafters set > 16” on center

R602.3.4 – Bottom (sole) plate
  Full bearing and at least as wide as studs

R602.3.5 - Braced Wall Panel Uplift Load Path

R602.4 – Interior load bearing studs
  – Constructed, framed and fireblocked as specified for exterior walls

R602.5 – Interior nonbearing walls
  – Allows 2 x 3, or 2 x 4 on flat
  – Still need to be fireblocked

R602.6 – Drilling and notching of studs
• Notching, maximum 25% for bearing studs, 40% for non-bearing
• Drilling, 60% maximum
  – See figures R602.6(1) and R602.6(2)
  – R602.6.1 – Drilling and notching of top plate
    » Figure R602.6.1
Tie strap to extend a minimum of 6" beyond the notch on both sides.
### R602.7 – Headers

- **Spans per Tables R602.7(1), (2) and (3)**
  - (1) Girder and Header Spans for Exterior Bearing Walls
  - (2) Girder and Header Spans for Interior Bearing Walls
  - (3) Girder and Header Spans for Open Porches

---

#### Example:

<table>
<thead>
<tr>
<th>Roof &amp; Ceiling only</th>
<th>Width</th>
<th>Allowable span</th>
<th>Number of jack studs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triple 2 x 10</td>
<td>36'</td>
<td>6' 2&quot;</td>
<td>2 each side</td>
</tr>
</tbody>
</table>

---

#### Table

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Ceiling Only</th>
<th>Open Porch only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6' 2&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jack studs</td>
<td>2 each side</td>
<td></td>
</tr>
</tbody>
</table>
R602.7.1 – Single member headers

TABLE R602.7.1(1)

<table>
<thead>
<tr>
<th>GIRDERS SPAN AND HEADER SPANS FOR EXTENSION WALLS</th>
<th>(Maximum spans for Douglas fir-larch, Hem fir, Southern pine and spruce-pine-fir and required number of jack stud)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>20</td>
</tr>
<tr>
<td>GROUND SNOW LOAD [psf]</td>
<td>1.5</td>
</tr>
<tr>
<td>Building width [in]</td>
<td>10</td>
</tr>
</tbody>
</table>

R602.7.2 Rim board headers

– Figure R602.7.2
Polling Question

The minimum number of full height studs on either side of a rim board header shall be?

a) The total number of studs displaced by the header  
b) Half the total number of displaced studs  
c) 1 for each 24" of header span  
d) 1 for each 16" of header span

R602.7.4 – (Headers for) Nonbearing walls

– No load to carry other than its own weight  
– Up to 8’ long & 24” in height, a single flat 2 x 4  
– Cripples and blocking not required

<table>
<thead>
<tr>
<th>Maximum Header Span (ft)</th>
<th>Ultimate Design Wind Speed and Exposure Category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 140 mph, Exposure B</td>
</tr>
<tr>
<td></td>
<td>or &lt; 120 mph, Exposure C</td>
</tr>
<tr>
<td></td>
<td>≤ 115 mph, Exposure B</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>4</td>
</tr>
</tbody>
</table>

For B, 1 header = 550 lb; 1 header ft = 0.842 lb; 1 header square = 0.443 sq. ft.

a. Per header support between 6 headers, note the minimum number of full-height studs associated with the longer header.  
b. Where a header is to support the header of a jack stud in accordance with Table R602.7.4(b), the minimum number of full-height studs at each end of a header shall be in accordance with requirements for wind speeds ≤ 140 mph, Exposure B.
R602.8 – Fireblocking
– Per R302.11 – 6 specific locations
  • To cut off vertical and horizontal concealed draft openings
  • To form an effective fire barrier between stories, and between a top story and a roof space
  • Shall be provided in the following locations:

Location # 1
Page 51

Location # 2
Page 51
R302.11.1 – Fireblocking materials
• 1 - Two inch nominal lumber
• 2 - Two thicknesses of one inch nominal lumber
• 3 - 23/32” wood structural panel
• 4 - 3/4” particleboard
• 5 - 1/2” Gypsum board
• 6 - 1/4” cement based millboard
• 7 - Mineral wool or glass fiber, securely in place
• 8 - Cellulose insulation tested for the application
Student exercise, wall framing:
– Using Section 602 of the RCNYS and
– The provided plans and
– Form # 3W, Sections 10, 11, 12
• Appendix Pages ## & ##

Check the plans for compliance

Polling Question
According to the general notes, where is fireblocking proposed to be provided?

a) At floor and ceiling levels
b) At soffits
c) At the chimney
d) At 8’ above finished floor
Note from
Section A
Sheet A3.04
19.2” o.c. was not
used, batt insulation
was cost prohibitive
While these plans do provide a good amount of detail, there are a number of items that are not shown (or not clearly shown)
More information will be needed regarding the design method used, or the prescriptive path that was followed.
**Basic Concept: Diaphragms**

Wind pushes against this wall

Floor and Roof Systems hold the top and bottom of the wall

Panels hold the floor and transfer the load
September 1, 2020

As the Building gets taller

More panel width needed on lower stories

September 1, 2020

[NY] R602.10 – Wall Bracing
– Comply with this section or R602.12
– Where all or part does not comply, design required

September 1, 2020

[NY] R602.10 Wall bracing.
At a minimum, the following information shall be included:
1. the location of braced wall lines.
2. the spacing of braced wall lines, including any offset of the braced wall panel line.
3. the braced wall line end conditions.
4. the location and length of braced wall panels.
5. the braced wall panel uplift load.
6. the construction method for braced wall panels, including connections to floor framing and foundations.
• **R602.10 – Wall Bracing**
  - May use both exterior and interior walls
  - Less limited range of conditions
  - Any type of foundation
  - Roof height not specified
  - Interior finishes not always required
  - Wind speeds up to <140
  - Seismic up to D3
  - For NYS worst SDC is D3
  - Cripple walls permitted
  - Offsets in braced wall lines
    - Limited to 4' to either side
    - May require more braced wall lines

• **R602.12 – Simplified Wall Bracing**
  - Only uses exterior walls
  - Assumes interior walls will intersect
  - Strict limits on applicability
  - Concrete or masonry foundation only
  - Eave to ridge height ≤ 15'
  - Minimum 1/2" GWB on the inside
  - Wind speeds ≤ 130
  - Seismic A, B, C for 1- and 2-family
    - Seismic A and B for Townhouses
  - No cripple walls in 3 story
  - Offsets in braced wall lines
    - Less limited, treated differently
    - May require extra braced panels

---

**WALL BRACING TERMINOLOGY**

- Diagonal lines indicate qualifying bracing segments

---

**R602.12 Simplified Wall Bracing**

- R602.12.1 Circumscribed rectangle
- R602.12.2 Sheathing materials
- R602.12.3 Bracing unit
- R602.12.4 Number of bracing units
- R602.12.5 Distribution of bracing units
- R602.12.6 Narrow panels
- R602.12.7 Lateral support
- R602.12.8 Stem walls
Section R602.12 Simplified Wall Bracing

- Strict limits on applicability
  - 8 listed criteria must all be met to use (next slide)
  - Works for both continuous and intermittent sheathing methods

1. No more than three stories above concrete or masonry foundation/basement
   *No permanent wood foundations*
2. No cantilever more than 24 inches
3. Wall height not greater than 10 feet.
4. Roof eave-to-ridge height of 15 feet or less.
5. Exterior walls shall have minimum ½" gyp. board on the interior.
6. Wind speed 130 mph or less, Exposure Category is B or C.
7. SDC A, B or C for 1 and 2-family dwellings or A or B for townhouses.

R602.12.1 Circumscribed rectangle.
The bracing required…
- shall be determined by circumscribing a rectangle…
- surround all enclosed offsets and projections…
- Open structures… permitted to be excluded.
- No side greater than 60 feet (18 288 mm)
- Ratio between the long and short side - maximum of 3:1.
R602.12.2 Sheathing materials.
The following sheathing materials installed on the exterior side of exterior walls shall be used to construct a bracing unit as defined in Section R602.12.3. Mixing materials is prohibited.
- 1. Wood structural panels with a minimum thickness of 3/8 inch fastened in accordance with Table R602.3(3).
- 2. Structural fiberboard sheathing with a minimum thickness of 1/2 inch fastened in accordance with Table R602.3(1).

R602.12.3 Bracing unit.
A full-height sheathed segment of the exterior wall No openings or offsets and Minimum length as specified.
Mixing of Items 1 and 2 is prohibited on the same story.
- 1. For continuously sheathed walls the minimum length of a bracing unit shall be 3 feet.
- 2. For intermittent sheathed walls the minimum length of a bracing unit shall be 4 feet.
Table is from the Commentary, so not in the RCNYS.

Polling Question

A bracing unit is best described as?

a) A full height segment of the exterior wall
b) A full height segment of an interior wall
c) A wall segment with openings
d) A wall segment with offsets
R602.12.5 Distribution of bracing units.
The placement of bracing units on exterior walls as shown in Figure R602.12.5.
- 1. Shall begin no more than 12 feet from any wall corner.
- 2. Distance between adjacent edges shall be no greater than 20 feet.
- 3. Segments of wall greater than 8 feet in length –
  • minimum of one bracing unit.

R602.12.6 Narrow panels.
- R602.12.6.1 Method CS-G.
  • One-story garages, equivalent to 0.5 of a bracing unit
- R602.12.6.2 Method CS-PF.
  • Portal Frame per R602.10.6.4; 0.75 of a bracing unit; max of 4 on all parallel sides
- R602.12.6.3 Methods PFH and PFG.
  • Portal Frame with hold downs equal one bracing unit
  • Portal Frame at Garage equals 0.75 bracing units
Things to keep in mind:
These are prescriptive provisions, not the only ways to do this.
Not all walls are braced wall lines.
Not all solid segments of walls are braced wall panels.
It is the applicants responsibility to identify the design method.
Where prescriptive provisions are used, it is the applicants responsibility to show compliance with the Code.

Translation – THEY need to leave YOU a ‘trail of breadcrumbs’ to follow.
Are they using these provisions?
Have they identified what they deem braced wall lines?
Have they identified the braced wall panels within each line?
Have they detailed the methods of construction for the panels used?
Where reductions are taken, have they identified wind uplift values and provided the calculations?

The 2020 RCNYS provides prescriptive methods to help insure that the walls, both interior and exterior, can safely perform their intended functions.

Any questions?

Next: Wall Covering in Chapter 7
Basic Training 9E The Residential Code

Lesson 6
Wall Coverings
Chapter 7

R701 General
R702 Interior Covering
R703 Exterior Covering

R702 Interior Covering
– R702.1 General
– R702.2 Interior plaster
– R702.3 Gypsum board and panel products
– R702.4 Ceramic tile
– R702.5 Other finishes
– R702.6 Wood shakes and shingles
– R702.7 Vapor retarders
R702.1 General
– Install per this chapter and Tables
  • R702.1(1) Thickness of plaster
  • R702.1(2) Gypsum plaster properties
  • R702.1(3) Cement plaster proportions
  • R702.3.5 Minimum Thickness and Application of Gypsum Board and Gypsum Panel Products

R702.3 Gypsum board and gypsum panel products
– R702.3.1 Materials
  • Shall conform to:
    – ASTM C22, C 475, C 514, C 1002, C 1047, C1177, C 1178, C 1278, C 1396, C 1658, or C1766
    – Installed per ASTM C 557

R702.3.2 Wood framing
– Where supporting gypsum board/panels
  • Minimum 2” nominal thickness in least dimension
    – Except 1” by 2” furring strips over solid backing or
    – Furring strips over framing not more than 24” o.c.
    – Shall be permitted
R702.3.5 Application

- Supports and fasteners
  - Comply with Table R702.3.5
  - Gypsum sheathing on exterior walls
    - Per Table R602.3.1 (Structural connections)
  - Applied at right angles or parallel to framing
  - Edges and ends shall occur over framing
  - Interior gypsum shall not be installed where directly exposed to weather or water
R702.3.5.1 Screw fastening

- For wood framing either Type W or Type S
  - Per ASTM C 1002
  - Minimum 5/8" penetration into wood
- For cold-formed steel framing only Type S
  - #6 screws
  - Per ASTM C 1002 or
  - Bugle head’ per ASTM C 1513
R702.3.6 Horizontal Gypsum Board Diaphragm Ceilings

- Table R702.3.6
- Installed perpendicular to framing
- Perimeters blocked with 2 by 6 material
- Installed flat, Minimum 2” nailing surface

---

**Table R702.3.6**

<table>
<thead>
<tr>
<th>Material</th>
<th>L (in.)</th>
<th>U (psi)</th>
<th>Shear Value (Gf of Unit)</th>
<th>Minimum Fasteners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gypsum board or gypsum panel product</td>
<td>1/2</td>
<td>165</td>
<td>60</td>
<td>56 teeth or equal substituted, 3/4” x 16, 2” x 10, 2” x 8, one nail each</td>
</tr>
</tbody>
</table>
R702.3.7 Water-resistant gypsum backing board
- Where used as a backer for tile or other water resistant finish
  • ASTM C1396, C1178, or C1278
- Shall not be installed over Class I or II vapor retarder
- Cut or exposed edges sealed per manufacturer
  - R702.3.7.1 Limitations
  • Shall not be used where directly exposed to water
  • Shall not be used where subject to continuous high humidity

R702.7 Vapor retarders
- Class I or II required in Zones 5 and 6
- On the interior side of framed walls
  • Exceptions:
    - Basement walls
    - Below grade portions of walls
    - Where moisture/freezing will not damage materials
  - R702.7.1 Class III vapor retarders
    • Permitted in accordance with Table R702.7.1

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### Polling Question

What class of vapor retarder can be used in climate zone 5 with a vented cladding over wood structural panel sheathing?

- a) Class I
- b) Class II
- c) Class III
- d) Class IV

### R703 Exterior Covering

**R703.1 General**

- Shall provide a weather resistant exterior wall envelope
  - Shall include flashing
    - Exception: Log walls per ICC 400

### R703.1.1 Water resistance

- Must prevent accumulation of water within the wall
  - Water-resistant barrier
  - Means for draining accumulated water
  - Protection against condensation
    - In accordance with R702.7 (vapor retarders)
  - Exceptions:
    - Concrete or masonry
    - Resistant to wind-driven rain per ASTM E 331
R703.1.2 Wind resistance
- Coverings, backing materials, attachments
  - Capable of resisting expected wind loads
    - Tables R301.2(2) and (3)
  - Determined by ASTM E 330 test method
    - Alternative methods permitted
    - Design using accepted engineering allowed

R703.2 Water-resistive barrier
- One layer of 15 pound asphalt felt
- Other approved water-resistive barrier
- Applied over studs or sheathing
  - Horizontally
    - Lapped not less than 2" vertically, 6" horizontally
  - Continuous top to bottom and around openings
- Must meet R703.1
- Not required for detached accessory buildings
R703.3 Nominal thickness and attachment
– Per Table R703.3(1) and
  • Material specific requirements
  • Based on 16” o.c. spacing of studs
  • Greater spacing when permitted by manufacturer
– Material specific sub-sections or
  – Manufacturers specification
– If over foam sheathing
  • Sections R703.15, .16, .17
– Fasteners per R703.3.2 and Table R703.2(1)

Polling Question
Which of the following constitutes a water resistive barrier?
a) One layer of 15# asphalt felt
b) Listed house wrap
c) Neither a nor b above
d) Both a and b above
R703.4 Flashing
– Approved, corrosion resistant
– Applied shingle fashion
  • Self-adhered membranes listed to AAMA 711
  • Liquid applied per AAMA 714
– Installed in the following locations:
  1. At exterior window and door openings
  2. At chimneys
  3. Under and at ends of copings and sills
  4. Continuously above projecting wood trim
  5. Where porches, decks, balconies attach
  6. At wall - roof intersections
  7. At built-in gutters
R703.5 through R703.14
–Material specific sections
–If that material is used, apply those provisions
List on next slide

R703.5 Wood, hardboard & wood structural panel
R703.6 Wood shakes and shingles
R703.7 Exterior plaster
R703.8 Anchored stone and masonry veneer, general
R703.9 Exterior insulation and finish system (EIFS)/EIFS with drainage
R703.10 Fiber cement siding
R703.11 Vinyl siding
R703.12 Adhered masonry veneer installation
R703.13 Insulated vinyl siding
R703.14 Polypropylene siding

Student exercise:
Using the plans provided and
Chapter 7 of the 2020 RCNYS and
Form 3W, Sections 15 and 16
Check the interior and exterior wall coverings for compliance
### Wall Covering

<table>
<thead>
<tr>
<th>Material</th>
<th>Chapter 7</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal Gypsum Ceiling Boards</td>
<td>R702.3.6, R702.3.7</td>
<td>Per Code R702.3.6. Installed perpendicular to framing. Perimeter edges blocked. Bolted at top plate of walls. Used as backer for non-absorbent finish (i.e., Tile).</td>
</tr>
<tr>
<td>Water-resistant Gypsum Backing Board</td>
<td>N/A</td>
<td>Per ASTM C-1396, 1178, or 1279.</td>
</tr>
<tr>
<td>Limitations</td>
<td>R702.3.7.1</td>
<td>N/A</td>
</tr>
<tr>
<td>Ceramic tile</td>
<td>R702.4</td>
<td>N/A</td>
</tr>
<tr>
<td>Backer boards</td>
<td>R702.4.2</td>
<td>N/A</td>
</tr>
<tr>
<td>Other finishes</td>
<td>R702.5</td>
<td>N/A</td>
</tr>
<tr>
<td>Wood shakes and shingles</td>
<td>R702.6</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor Retarders</td>
<td>R702.7</td>
<td>N/A</td>
</tr>
<tr>
<td>Class III vapor retarders</td>
<td>R702.7.1</td>
<td>N/A</td>
</tr>
<tr>
<td>Materials vapor retarder class</td>
<td>R702.7.2</td>
<td>N/A</td>
</tr>
<tr>
<td>Minimum clear airspace and vented openings for vented cladding</td>
<td>R702.7.3</td>
<td>N/A</td>
</tr>
<tr>
<td>Class I</td>
<td>OK</td>
<td>Class I</td>
</tr>
<tr>
<td>Per Table R702.7.1</td>
<td>OK</td>
<td>Class I</td>
</tr>
<tr>
<td>Brick veneer clear airspace per Table R702.8.4</td>
<td>Other approved vented cladding</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Exterior Covering

<table>
<thead>
<tr>
<th>Section</th>
<th>Code</th>
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<tr>
<td>General</td>
<td>R13.1</td>
</tr>
<tr>
<td>Water resistance</td>
<td>R13.1.1</td>
</tr>
<tr>
<td>Wind resistance</td>
<td>R13.1.2</td>
</tr>
<tr>
<td>Water-resistant Barrier</td>
<td>R13.2</td>
</tr>
<tr>
<td>Nominal thickness and attachment</td>
<td>R13.3</td>
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<tr>
<td>Soffit installation</td>
<td>R13.3.1</td>
</tr>
<tr>
<td>Wind limitations</td>
<td>R13.3.2</td>
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<tr>
<td>Fasteners</td>
<td>R13.3.3</td>
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<tr>
<td>Min. Fastener Length &amp; Penetration</td>
<td>R13.3.4</td>
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<tr>
<td>Flashing</td>
<td>R13.4</td>
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<tr>
<td>Exterior Covering</td>
<td>R703.6</td>
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<tr>
<td>-------------------</td>
<td>--------</td>
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<tr>
<td>General</td>
<td>R73.1</td>
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<td>Water resistance</td>
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<tr>
<td>Wind resistance</td>
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<tr>
<td>Water-resistive Barrier</td>
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<td>Nominal thickness and attachments</td>
<td>R73.3</td>
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<tr>
<td>Soffit installation</td>
<td>R73.3.1</td>
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<tr>
<td>Wind Limitations</td>
<td>R73.3.2</td>
</tr>
<tr>
<td>Fasteners</td>
<td>R73.3.3</td>
</tr>
<tr>
<td>Finishing</td>
<td>R73.3.4</td>
</tr>
<tr>
<td>Corrosion resistant, applied shingle fashion</td>
<td>R73.4</td>
</tr>
</tbody>
</table>

### Specific Exterior Covering Materials

**Wood, Hardboard, Wood Structural**

<table>
<thead>
<tr>
<th>Material</th>
<th>R703.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel siding</td>
<td>R703.6.1</td>
</tr>
<tr>
<td>Vertical wood siding</td>
<td>R703.6.2</td>
</tr>
<tr>
<td>Panel siding</td>
<td>R703.6.3</td>
</tr>
<tr>
<td>Horizontal wood siding</td>
<td>R703.6.4</td>
</tr>
<tr>
<td>Wood Shakes and Shingles</td>
<td>R703.6.5</td>
</tr>
<tr>
<td>Application</td>
<td>R703.6.6</td>
</tr>
<tr>
<td>Weather exposure</td>
<td>R703.6.7</td>
</tr>
<tr>
<td>Attachment</td>
<td>R703.6.8</td>
</tr>
<tr>
<td>Bottom course</td>
<td>R703.6.9</td>
</tr>
<tr>
<td>Exterior Flasher</td>
<td>R703.7</td>
</tr>
<tr>
<td>Lath</td>
<td>R703.7.1</td>
</tr>
<tr>
<td>Rafter</td>
<td>R703.7.2</td>
</tr>
<tr>
<td>Nails</td>
<td>R703.7.3</td>
</tr>
<tr>
<td>Application (of plaster)</td>
<td>R703.7.4</td>
</tr>
<tr>
<td>Cutting</td>
<td>R703.7.5</td>
</tr>
</tbody>
</table>

**Board, metal, asphalt, concrete, shingles, shakes**

<table>
<thead>
<tr>
<th>Material</th>
<th>R703.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel siding</td>
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<td>Attachment</td>
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<tr>
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<td>Application (of plaster)</td>
<td>R703.7.4</td>
</tr>
<tr>
<td>Cutting</td>
<td>R703.7.5</td>
</tr>
</tbody>
</table>

**Not shown, no details**

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**37**

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**38**

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**39**

---
| Brick | Veneer | No details provided | N/A | N/A | OK | Verify at insp | N/A | N/A | N/A | N/A | N/A | N/A |
Chapter 7 regulates both interior and exterior wall coverings as well as:
- Vapor barriers on the inside of wall assemblies
- Water resistant barriers on the outside and
- Flashings.
It relies on proper selection and attachment of the components to insure a weather resistant building envelope

Next: Chapter 8, Roof-Ceiling Construction
Chapter 8 Roof-Ceiling Construction

R801 - General
- Design and construction of roof-ceiling
  - Shall accommodate all imposed loads
    - And transmit to the supporting structure
  - Collect and discharge roof drainage
    - To the ground and
    - Safely away from the building
R802.1 – General
  – [NY] R802.1.1 – Sawn Lumber
    • Identified by grade mark
      – Or certified by an agency
    » [NY] Exception for locally produced
  – R802.1.2 through R802.1.7
    • Alternatives to traditional sawn lumber
      – Structural glued laminated timber, log members, composite lumber, fire-retardant, cross-laminated timber, engineered wood rim board.

R802.2 – Design and Construction
  – Details for minimum roof slope of 3:12
    • Figures and fastening per Chapter 6
      – Or American Wood Council National Design Specification

R802.3 – Ridge
  • Connected by a minimum 1” nominal board
  • Depth at least equal to cut end of rafter
  • Without ceiling joists or rafter ties
    – Design as a beam with support at each end
– R802.4 Rafters
  • R802.4.1 Rafter size
    – Per tables R802.4.1(1) through R802.4.1(8)
    – Span measured along horizontal projection
    – Other conditions can use AWC STJR
  • R802.4.2 Framing details
    – Rafters ≤1.5” offset at ridge
    » Or in line using collar tie, gusset plate or ridge strap
Polling Question

Alternatives to a ridge board at the tops of opposing rafters include?

a) A gusset plate
b) A ceiling joist
c) Solid blocking
d) None of the above

Table R802.4.1(1) – Roof live load 20 psf, ceiling not attached
Table R802.4.1(2) – Roof live load 20 psf, ceiling attached
Table R802.4.1(3) – Ground snow load 30 psf, ceiling not attached
Table R802.4.1(4) – Ground snow load 30 psf, ceiling attached
Table R802.4.1(5) – Ground snow load 50 psf, ceiling not attached
Table R802.4.1(6) – Ground snow load 50 psf, ceiling attached
Table R802.4.1(7) – Ground snow load 70 psf, ceiling not attached
Table R802.4.1(8) – Ground snow load 70 psf, ceiling attached
### Table 922.1.12
**Rafter Spread for Common Lumber Species**

<table>
<thead>
<tr>
<th>Species and Grade</th>
<th>Dead Load (per sq ft)</th>
<th>Live Load (per sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 x 4</td>
<td>2 x 6</td>
</tr>
<tr>
<td></td>
<td>2 x 8</td>
<td>2 x 10</td>
</tr>
<tr>
<td></td>
<td>2 x 12</td>
<td>2 x 10</td>
</tr>
</tbody>
</table>

Minimum safe spread

### Table 922.1.13
**Rafter Spread for Common Lumber Species**

<table>
<thead>
<tr>
<th>Species and Grade</th>
<th>Dead Load (per sq ft)</th>
<th>Live Load (per sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 x 4</td>
<td>2 x 6</td>
</tr>
<tr>
<td></td>
<td>2 x 8</td>
<td>2 x 10</td>
</tr>
<tr>
<td></td>
<td>2 x 12</td>
<td>2 x 10</td>
</tr>
</tbody>
</table>

Minimum safe spread

### Table 922.1.14
**Rafter Spread for Common Lumber Species**

<table>
<thead>
<tr>
<th>Species and Grade</th>
<th>Dead Load (per sq ft)</th>
<th>Live Load (per sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 x 4</td>
<td>2 x 6</td>
</tr>
<tr>
<td></td>
<td>2 x 8</td>
<td>2 x 10</td>
</tr>
<tr>
<td></td>
<td>2 x 12</td>
<td>2 x 10</td>
</tr>
</tbody>
</table>

Minimum safe spread
### Appendix Page 3

**Rafter exercise 1:**
- 2 X 10 SPF # 2, Ground snow load 50 psf, Dead load 10 psf, No ceiling attached
- Which table?
- Allowable rafter span at 16” o.c.?
- Allowable rafter span at 24” o.c.?

---

**Rafter exercise 2:**
- 2 X 12 SPF # 2, Ground snow load 70 psf, Dead load 10 psf, Ceiling attached
- Which table?
- Allowable rafter span at 16” o.c.?
- Allowable rafter span at 19.2” o.c.?

---

**Rafter exercise 3:**
- 2 X 8 Hem-Fir # 2, Ground snow load 30 psf, Dead load 10 psf, Ceiling attached
- Which table?
- Allowable rafter span at 12” o.c.?
- Allowable rafter span at 24” o.c.?
R802.5 – Ceiling joist size
  – Table R802.5(1)
    • Uninhabitable attics, without storage
    • Live load 10 psf, dead load 5 psf
  – Table R802.5(2)
    • Uninhabitable attics, with limited storage
    • Live load 20 psf, dead load 10 psf

R802.6 - Bearing
R802.7 - Cutting, drilling, notching
R802.8 - Lateral support
R802.9 - Framing of openings

Very similar to Chapter 5 Floors
R802.10 – Wood Trusses

– R802.10.1 Truss design drawings
  • Minimum information to be provided
– R802.10.2 Design
  • Accepted engineering practice or ANSI/TPI 1
– R802.10.3 Bracing
  • Indicated in design documents or per accepted practice
– R802.10.4 Alterations to trusses
  • In accordance with design or per RDP
A typical truss design drawing will include the loading conditions –
- Top chord dead and live load
- Bottom chord dead and live load
- Ground snow load
- Wind speed
- Wind exposure category
- Etc.

Our job is to verify they used the correct information

In a complex design, with different trusses, there will typically be a ‘layout plan’ that will identify locations for the various trusses. This plan may include ‘girder trusses’, where 2 or more plies are nailed together

We inspect to this plan

Polling Question
Truss design drawings are required to be provided to and approved by the Building Official when?

a) At the time of application for a permit
b) Any time prior to final inspection
c) Prior to installation
d) Once bracing has been installed
R802.11 Roof tie-down
- R802.11.1 Uplift resistance
  - R802.11.1.1 Truss uplift resistance
    - Per design drawings or
    - Table R802.11
  - R802.11.1.2 Rafter uplift resistance
    - As determined by Table R802.11 or
    - accepted engineering practice

R803 Roof Sheathing
- R803.1 Lumber sheathing
  - Spans per Table R803.1,
    - Minimum Thickness of Lumber Roof Sheathing
- R803.2 Wood structural panel sheathing
  - R803.2.1 Identification and grade – per Chapter 5
  - R803.2.2 Allowable spans – per Chapter 5
  - R803.2.3 Installation – per Chapter 6
R805 Ceiling Installation
– Per R702 (wall finishes)

R806 Roof Ventilation
– Generally required
– Allowances for unvented assemblies

R807 Attic Access
– Minimum opening size
  • Based on how much space is up there

Student exercise –
Using the roof framing plan and
Chapter 8
Complete Sections 17 through 21 of Form 3W

Proposed
to use
trusses
OK
N/A
N/A

Per the section:
Grade stamped or certified
Exception for ungraded lumber
Certificate from sawyer

Per ANSI/ASTM A 190.1 and ASTM D3777
Per ISO 400

Per ASTM D5404

Flame spread index of 25 or less,
per ASTM E 84 or UL 723

Per ANSI/AAPA PRR 330
Per ANSI/AAPA PRR 410 or evaluated per ASTM D 790
Per ASTM D 8033
The Roof Framing Plan
Sheet A3.09
Shows truss layout
Rafter framing in-fill
Shaded areas
Attic access location

Section A on Sheet A3.04
Indicates 1/2" roof sheathing
Trusses at 24" o.c.

Section B, Sheet A3.04
Vented soffit shown on the far left
Ridge vent shown at the top
Title 19 Part 1265 – Residential Structures with Truss Type Construction, Pre-Engineered Wood Construction and/or Timber Construction
Effective January 1, 2015

Code Enforcement Officials shall not issue a Certificate of Occupancy for a residential building that contains truss-type construction, pre-engineered wood construction or timber construction unless:

1. The owner has notified the AHJ, on the form prescribed in the rule,
2. The structure has the sign prescribed in the rule attached in the place prescribed in the rule.

NOTICE OF UTILIZATION OF TRUSS TYPE CONSTRUCTION, PRE-ENGINEERED WOOD CONSTRUCTION AND/OR TIMBER CONSTRUCTION IN RESIDENTIAL STRUCTURES

IN THE FOLLOWING LOCATION(S) (CHECK APPLICABLE BOX):

- Floor Framing, Including Girders and Beams (F)
- Roof Framing (R)
- Floor Framing and Roof Framing (FR)

SIGNATURE: DATE:

PRINT NAME:
CAPACITY (Check One):
Owner Owner's Representative

A Division of New York Department of State
Truss Signage- Residential Buildings

Part 1265 Residential Structures with Truss Type Construction, Pre-Engineered Wood Construction and/or Timber Construction

Any person utilizing truss type, pre-engineered wood or timber construction for the erection of any new residential structure, for any addition to an existing residential structure, or for any rehabilitation of an existing residential structure must:

September 1, 2020

Amendment to Title 19 Part 1265

Affix a sign or symbol to the electric box, or adjacent to the electric box

Or a location approved by the authority having jurisdiction as a location likely to be seen by firefighters or other first responders

6 inch circle

Reflective White background

Reflective Red symbol and designations
Polling Question

The requirement to identify truss construction on a single family dwelling is found in what part of Title 19 NYCRR?

a) Part 1219  
b) Part 1220  
c) Part 1228  
d) Part 1265

Conclusion –

- Chapter 8 of the 2020 RCNYS contains prescriptive provisions for the structural components of the roof
  • Many of these provisions are similar to Chapter 5, Floors
  • Several sections refer back to Chapters 3, 5 & 6
- Now let’s inspect the framing
Bottom of Master Bedroom trusses. These are ‘saddle bearing’ trusses. The load is carried above on a knee wall.
Truss Design Drawings

- Truss Bracing
  Specified by the manufacturer
  Or Design Professional

  Both permanent and temporary bracing will be specified
FEATURES

• Fully assembled, self-contained unit
• Constructed of high carbon, heavy duty steel
• Finished with corrosion-resistant powder
• Available in adjustable lengths up to 12’
• Poured concrete locks post adjustment permanently

Things don’t always get built as drawn

The wall supporting the beam was laid out wrong and ended up 8” short. The last 2 studs were added to try and make up the difference. No continuous top plate and the beam is bearing only on those 2 studs which are supported only by floor sheathing below...
A few more things to watch for...

Ridge board is required to be full depth. This will weaken the roof rafters and possibly cause them to fail.
Rafter to ridge connections need to be tight to carry the loads. Poorly cut angles that leave gaps or poorly fitted connections will weaken the roof.
Tight fitting connections and full depth ridge, in this case a hip roof.

Joist notching...

Allowable depth is 1/6 the depth of the joist.
Framing inspections need to be done thoroughly to insure the building will withstand the forces that will affect it.

Structural connections need to be made properly, with good workmanship.

Identifying poor workmanship is an important part of the job.

Next: Chapter 9, Roof Assemblies
Lesson 8
Roof Assemblies
Chapter 9

R902.1 Roof covering materials
– Materials per R904 and R905
– Class A, B, or C where edge is < 3' from lot line
– Class A, B, & C shall be tested and listed
  • UL 790 or ASTM E 108
– Exceptions – most metals and masonry are Class A
R902.2 Fire-retardant treated
– Shingles and shakes shall be pressure treated
  • Per AWPA C1
  • Each bundle marked
  • Labeled with classification

R902.3 Building-integrated PV product
– Listed and labeled for fire classification
  – Per R902.1
R902.4 Rooftop-mounted PV panel systems
– Tested, listed, identified
  • Per UL 1703 and UL 2703
  – Class A, B, or C where < 3’ to lot line

R903 Weather Protection
– R903.2 Flashing
  • Installed to prevent water from entering
    – Wall – roof intersections
    – Change in slope and around openings
    – IF metal, corrosion resistant, ≥ 0.019”
    – Cricket or saddle at chimneys > 30” wide
      » At skylights, flash per manufacturer
– R903.4 Roof drainage
  • Over the edge or at low points for flat roof
R904 Materials
— Comply with material requirements in R905
— Materials shall be compatible
— Conform to applicable standards
— Packages to be labeled

R905 Requirements for roof coverings
— Applied per this section and manufacturer
  • Underlayment conform to applicable standards
    — Table R905.1.1(1)
    — Applied per Table R905.1.1(2)
    — Attached per Table R905.1.1(3)
— R905.1.2 Ice barriers
  • Always required in NYS due to ice damming

R905.2 through R905.17
— Material specific requirements
  • Asphalt shingles; Clay and concrete tile; Metal roof shingles; Mineral surface roll roofing; Slate shingles; Wood shingles; Wood shakes; Built-up roofs; Metal roof panels; Modified bitumen; Thermoset single-ply; Thermoplastic single-ply; Spray polyurethane foam; Liquid-applied; Photovoltaic shingles; BIPV.
R905.2 Asphalt shingles

- Solidly sheathed deck
- Slope, 2:12 or steeper
  - 2:12 to 4:12 use double underlayment
- Wind resistance per ASTM D 7158
  - Sealed shingle standard
- Fasteners per ASTM F 1167
  - Minimum 3/4" penetration into deck
- Attachment per manufacturer
- Flashing including drip edge on all edges

Fastening Instructions

- Use fasteners S89 or shallower than the top cut-out and below the flashing." If the top cut-out is shallower than the fastener, the flashing is at risk of leaking and contributes to blow-offs.
- Use tight-fasteners in areas prone to high winds, per shingle manufacturer's recommendations. 
- Use minimum 3/4" penetration into the deck.
- Attachments per manufacturer's recommendations.
- Flashing including drip edge on all edges.
Polling Question

Asphalt shingles require a solidly sheathed deck with a minimum slope of?

a) 1 on 12
b) 2 on 12
c) 3 on 12
d) 4 on 12

A Division of New York Department of State

Building Standards and Codes
Student exercise

– Form # 4
  • Appendix page ##
– Complete the appropriate sections using the plans provided
### Residential Code - Roof Assemblies Plan Review Form # 4

**Owner:**

**Reviewed by:**

**Location:**

**Date:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Code Section</th>
<th>Required / Allowed</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof Exterior Surfaces</td>
<td>Chap. 6: R905</td>
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<tr>
<td>Pre-Construction</td>
<td>R905.1</td>
<td></td>
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<tr>
<td>Weather Protection - General</td>
<td>R905.2</td>
<td></td>
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<tr>
<td>Flashing</td>
<td>R905.3</td>
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<tr>
<td>Coating</td>
<td>R905.4</td>
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<tr>
<td>Roof Drainage</td>
<td>R905.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>R904</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- >=3' from line
- N/A
- No details
- OK

### Requirements for Roof Coverings

<table>
<thead>
<tr>
<th>Material #1 (Specify)</th>
<th>R905.2</th>
<th>Application and Underlayment</th>
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</thead>
<tbody>
<tr>
<td>Asphalt</td>
<td></td>
<td>Identify proposed coverings</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td>(Provide details in next section)</td>
</tr>
</tbody>
</table>

2208 IKO
Fiberglass Shingles
(Asphalt shingles)

### Sheathing deck requirements

- Minimum slope: 2:12
- Per Table 905.1.1(1)
- 1/2" underlayment
- OK
- N/A
- OK
- Verify all at inspection

---

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R905.16 Photovoltaic shingles
- Per this section, R324, and NFPA 70
- Solid (or closely fitted) deck
- Slope 2 : 12 or steeper
- Underlayment per ASTM D 4869 or 6757
  • Applied shingle fashion
  • R905.16.3.1 Ice barrier always required in NYS
  • High wind areas, corrosion resistant fasteners
  - Listed and labeled to UL 1703
  - Attach per manufacturer
  - Wind resistance per ASTM D 3161, Table R905.2.4.1
Polling Question

Which of the following is not true regarding photovoltaic shingles?

a) They must comply with section R324
b) They must comply with the National Electric Code
c) Ice and water shield is not required
d) They must be listed to UL 1703

Chapter 8 - Roof assemblies must provide weather-resistant protection for the structure

This chapter recognizes 14 different types of roofing materials

Proper installation methods outlined in this chapter and in the manufacturer’s specifications must be followed

Reroofing is also regulated by this chapter

Next: Chapter 10 – Chimneys and Fireplaces
Basic Training 9E The Residential Code

Lesson 9
Chimneys and Fireplaces
2020 RCNYS Chapter 10

Chapter 10 Chimneys and Fireplaces

• R1001 Masonry Fireplace
• R1002 Masonry Heaters
• R1003 Masonry Chimneys
• R1004 Factory-Built Fireplaces
• R1005 Factory Built Chimneys
• R1006 Exterior Air Supply

Chapter 10

• Regulates Chimneys and Fireplaces
  – Masonry fireplaces, chimneys and heaters
  • Prescriptive Requirements
  – Factory built fireplaces and chimneys
  • Require listing and labeling
• But that’s not all, it also contains…
  • Requirements for exterior air supply
  • Requirements for the use of unvented gas log heaters
R1001 Masonry Fireplace

- Constructed to requirements of chapters 3 and 4 of the RCNYS
- Footing
  - Solid masonry or concrete
  - Minimum 12” thick
  - Minimum 6” wider than exterior of chimney
  - Located below frost line
- Seismically reinforced in SDC D₁, D₂
R1002 Masonry Heaters

- R1002.2 Installation
- Masonry heaters shall be installed to one of the following:
  - ASTM E 1602 OR
  - Listed and label in accordance with UL 1482 or CEN 15250 and installed in accordance with manufacturer’s instructions.

R1003 Masonry Chimneys

- R1003.2 Footings and foundations
  - Solid masonry or concrete
  - Minimum 12” thick
  - Minimum 6’ wider than exterior of chimney
  - Located below frost line

R1003.3 Seismic reinforcing

- Seismic Category D₀, D₁ or D₂
  - Masonry and concrete chimneys will be reinforced and anchored as detailed in section R1003.3.1 & R1003.3.2.
R1003.5 Corbeling

Meet the requirements of this section.

R1003.9 Termination

- 2' higher than peak or highest portion of roof within 10' of chimney
- 3' higher than roof deck at the high side of the penetration point

R1003.18 Chimney Clearances

- Chimneys located in building or in exterior walls must have 2" clearance to combustibles
- Those located completely outside the building must have a 1" clearance to combustibles
R1003.20 Chimney Crickets

- Required on chimneys 30” and wider
- Crickets to be sized in accordance with figure 1003.20 and Table R1003.20

R1004 Factory-Built Fireplaces

- R1004.1 General
  - Shall be listed and labeled
  - Installed in accordance with the listing and manufacturer’s specifications
  - Tested according to UL 127

Polling Question

Chimney crickets are required when?

a) Any time the chimney penetrates the roof
b) When the chimney is in contact with the roof
c) Chimney crickets are always required
d) When the chimney is 30” or wider
R1004 .4 Unvented Gas Log heaters

• Shall not be installed in a Factory-built Fireplace
  – Unless the fireplace was Tested, Listed, Labeled
  In accordance with to UL 127

R1005 Factory Built Chimneys

• R1005.1 LISTING
  – Shall be listed and labeled
  – Shall be installed per manufacturers instructions

• R1005.3 SOLID FUEL APPLIANCES
  – Factory built chimneys shall comply with the Type HT requirements of UL 103
  – Marked “Type HT” and “Residential Type and Building Heating Appliance Chimney.”

R1005 Factory Built Chimneys

• R1005.8 INSULATION SHIELD
  – Required when factory built chimney passes through an insulated assembly
  – 26 gauge thick steel shield
  – Clearances as specified by the manufacturer’s installation instructions
  – Terminate no less than 2” above insulation
R1006 Exterior Air Supply

- R1006.1 Exterior Air
  - Shall be equipped with an exterior air supply
  - R1006.1.1 Factory-built Fireplaces
  - R1006.1.2 Masonry Fireplaces

- R1006.2 Exterior Air Intake
- R1006.3 Clearance
- R1006.4 Passageway
- R1006.5 Outlet

Fireplace

- A direct-vent fireplace

Summary

- Chapter 10 regulates
  - Factory built chimneys and fireplaces
  - Masonry built chimneys and fireplaces

- Masonry units comply with
  - Table R1001.1 and Figure R1001.1

- Factory units comply with
  - Manufacturer’s listing, labeling and installation requirements and this chapter

Next: Chapter 11, Energy
Chapter 11

Energy Conservation
Residential Compliance

Minimum prescriptive requirements for the design and construction of energy-efficient buildings and systems...
Objectives

N1101 General
N1102 Building Thermal Envelope
N1103 Systems
N1104 Electrical Power & Lighting Systems (Mandatory)

[NY] N1101.1 Scope
This chapter regulates the energy efficiency for the design and construction of buildings regulated by this code.

Note: The section numbers appearing in parenthesis after each section number are the section numbers of the corresponding text in the International Energy Conservation Code-Residential Provisions.

Example: N1101.2 (R101.4) Intent

Exceptions to the Scope of Chapter 11

• [NY] N1101.1 Exceptions: Any of the following, provided the energy use of the building is not increased.
• 1.1 storm windows installed over existing fenestration;
• 1.2 glass only replacements in an existing sash and frame;
• 1.3 existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation;
• 1.4 construction where the existing roof, wall or floor cavity is not exposed;
• 1.5 reroofing for roofs where neither the sheathing nor the insulation is exposed; roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing;

• 1.6 replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates such conditioned space from the exterior shall not be removed;
• 1.7 alterations that replace less than fifty percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power; or
• 1.8 alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.

• 2. Historic buildings as defined in this chapter.

N1101.3 Compliance Materials
• [NY] N1101.3.1 (R101.5.1) Compliance Software
  – ResCheck
  – Other software approved by Secretary of State
• [NY] N1101.3.1.1 Software Requirements
  • Must be compliant with ECCCCNYS
  • [NY] N1101.3.1.1.1 (R105.2) Mandatory Provisions
    – Must all be met.
N1101.5

- Information on construction documents.
- Drawn to scale
- Electronic media documents are permitted
  - when approved by the building official.
- Details shall include, but are not limited to, as applicable:

N1101.5.1 Thermal Envelope Depiction

Shall be represented on the construction documents

N1101.6 Defined terms

The following words and terms shall, for the purposes of this chapter, have the meanings shown herein.

Defined terms appear in italics in the Code text
Table N1101.7

Climate Zones:
Most of NY is Zone 5 and Zone 6
NYC, L.I., Westchester - Zone 4

Polling Question

The climate zone for Ontario County is?

a) 4A
b) 5A
c) 6A
d) 7A
New York State’s 3 climate zones
All 3 are ‘moist’

TABLE N1101.7

Climate zones, moisture regimes, warm-humid designations by state, county and territory.
A-Moist (All of NY)
B-Dry
C-Marine

N1101.10.1
Building thermal envelope insulation:
An R-value identification mark shall be applied by the manufacturer to each piece of insulation 12 inches or greater in width.
N1101.10.2 – Installed to be readily visible for inspection
Blown or sprayed roof/ceiling insulation
The thickness of blown-in or sprayed insulation (fiberglass or cellulose) shall be written in inches on markers that are installed at least one every 300 sq. ft. R-value shall be listed on certification.
N1101.10.1.1

A permanent certificate shall be:

- Completed by the builder
- or other approved party
- Posted on a wall in the space
  - Where the furnace is located, utility room or
  - An approved location inside the building.
(Prescriptive)
The building thermal envelope shall meet the requirements of sections N1102.1.1 – N1102.1.5
Polling Question

The first exception at 1102.1 states that low energy buildings need not comply with?

a) Chapter 11  
  c) The Building Thermal Envelope Provisions  
  d) The Mechanical Code

Section N1102

- Specifically listed items for Building Thermal Envelope:
  - N1102.1.1 - Vapor retarders (per Section R702.7)  
  - [NY] N1102.1.2 - Insulation and Fenestration criteria  
  - N1102.1.3 - R-value computation  
  - N1102.1.4 - U-factor alternative  
  - N1102.1.5 - Total UA alternative

N1102.1.1 Vapor retarder

Wall assemblies in the building thermal envelope shall comply with the vapor retarder requirements of Section R702.7.
[NY] N1102.1.2 (R402.1.2) Insulation and fenestration criteria.

The building thermal envelope shall meet the requirements of Table N1102.1.2 based on the climate zone specified in Section N1101.7. In Climate Zone 6, the building thermal envelope shall meet either the requirements of the Climate Zone 6 “option 1” row in Table N1102.1.2 or the requirements of the Climate Zone 6 “option 2” row in Table N1102.1.2.

N1102.2 Specific Insulation Requirements (Prescriptive)

In addition to the requirements of section N1102.1, insulation shall meet the specific requirements of Sections N1102.2.1-N1102.2.13.
N1102

- N1102.2.1 – Ceilings with attic spaces
- N1102.2.2 – Ceilings without attic spaces
- N1102.2.3 – Eave baffle
- N1102.2.4 – Access hatches and doors
- N1102.2.8 – Floors
- N1102.2.9 – Basement walls

N1102.2.1 Ceilings with attic spaces

- R-49 may be reduced to R-38
- Where 100% insulated and
- Full depth at top plate of wall at eaves
- Not permitted with U-factor alternative
- Not permitted with total UA Alternative

Reductions allowed:

- R49 to R38
- Uncompressed Insulation
- Raised heel truss
- Raised rafter (engineered)
N1102.2.2 Ceilings without attic spaces

- Where greater than R-30 required
- And roof-ceiling does not provide space
- R-30 permitted for the lesser of
  - 500 s.f. or 20% of ceiling area
  - Not permitted with U-factor alternative
  - Not permitted with total UA Alternative

Example for N1102.2.2

N1102.2.3 Eave baffle

For air-permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. The baffle shall be permitted to be any solid material.
N1102.2.3

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N1102.2.4 Access Hatches and Doors

Access doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces Shall be weather-stripped and insulated equivalent to the insulation on the surrounding surfaces.

Exception: Vertical doors (in a knee wall) meet Table R1102.1.2
Polling Question
Which of the following is true regarding Attic Access Hatches?

a) They are not required to be insulated
b) They can’t be sealed against air leakage
c) They are not regulated in the Energy Code
d) They shall be weather-stripped and insulated

N1102.2.5 (R402.2.5) Mass walls. Mass walls where used as a component of the building thermal envelope shall be one of the following:
1. Above-ground walls of concrete block, concrete, insulated concrete form, masonry cavity, brick but not brick veneer, adobe, compressed earth block, rammed earth, solid timber or solid logs.
2. Any wall having a heat capacity greater than or equal to 6 Btu/ft² °F (123 kJ/m² K).

N1102.2.8 - Floors
Floor framing cavity insulation shall be installed to maintain permanent contact with subfloor
**N1102.2.9 – Basement walls**

- Top of the wall down 10' below grade or to the basement floor, whichever is less.
- Unless the floor above is insulated

**N1102.3 - Fenestration**

- **N1102.3.1 – U-factor**
  - Area-weighted average permitted
- **N1102.3.2 – Glazed fenestration SHGC**
  - Area-weighted average permitted
  - Dynamic glazing permitted with conditions
- **N1102.3.3 – Glazed fenestration exemption**
- **N1102.3.4 – Opaque door exemption**
- **N1102.3.5 – Sunroom fenestration**

**DOUBLE-HUNG WINDOWS**

**Glazing Performance: Total Unit**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>TYPE OF GLAZING</th>
<th>U-value</th>
<th>SOLAR-REJECTION COEFFICIENT</th>
<th>% SOLAR LIGHT TRANSMISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ProLine Window</td>
<td>U = .33</td>
<td>.04</td>
<td>0.61</td>
<td>58</td>
</tr>
</tbody>
</table>

**ProLine Window U = .33**
N1102.4 Air leakage Mandatory:

The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections N1102.4.1-N1102.4.6.

- Building thermal envelope
  - Installation – per manufacturers and this Code (Table N1102.4.1.1)
  - Testing – Blower door test, 3 ACH maximum, allows 3rd party
- Fireplaces
- Tight fitting flue dampers or doors
- Fenestration air leakage
  - Windows/skylights maximum 0.3 cfm/s.f.; doors maximum 0.5 cfm/s.f.
  - Rooms containing fuel burning appliances
  - Outside thermal envelope or isolated and equal to thermal envelope
- Maximum fenestration U-factor and SHGC (Mandatory)

<table>
<thead>
<tr>
<th>TABLE N1102.4.1 (MND-2.4.1.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPONENT</td>
</tr>
<tr>
<td>-----------</td>
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<tr>
<td>General</td>
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<tr>
<td>Extensive</td>
</tr>
<tr>
<td>Walls</td>
</tr>
<tr>
<td>Windows, skylights, and doors</td>
</tr>
<tr>
<td>Runouts</td>
</tr>
<tr>
<td>Doors</td>
</tr>
</tbody>
</table>
**Blower door test**

**Typical locations where air leakage occurs**

**[NY] N1102.4.1.2 Testing**

The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding … **three air changes per hour maximum.**
N1102.4.5
Recessed Lighting
– Sealed to limit air leakage
– Labeled for maximum 2cfm
– Must be IC rated
– Where in contact with insulation
– Gasketed or Caulked

N1103 Systems
N1103.1 Controls Mandatory
At least one thermostat shall be provided for each separate heating and cooling system.

N1103.1.1 Programmable thermostat
The thermostat controlling the primary heating or cooling system of the dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day.
**N1103.1.2 Heat pump supplementary heat Mandatory**

Heat pumps having supplementary electric resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

**N1103.3 Ducts**

**N1103.3.1 Insulation Prescriptive:**

Supply and return ducts in attics shall be insulated to a minimum of R-8 where 3 inches in diameter and greater and R-6 where less than 3 inches in diameter...

**Exception:**

Ducts or portions located completely inside the building thermal envelope.

**Polling Question**

The intent of the exception at N1103.3.1 means what regarding ducts completely within the thermal envelope?

- a) They are not required to be insulated
- b) They are exempt from N1103 entirely
- c) They shall not be installed
- d) They need not be sealed
[NY] N1103.3.2 Sealing Mandatory:

- Ducts, air handlers and filter boxes shall be sealed.
- Exceptions:
  - 1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
  - 2. For ducts having a static pressure classification of less than 2 inches of water column.

N1103.3.2.1 Sealed air handler

- Manufacturers designation
- Air leakage no more than 2% of design air flow
- Per ASHRAE 193

N1103.3.3 Duct testing Mandatory

Ducts shall be pressure tested to determine air leakage by one of the following methods.

1. Rough in test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system
2. Post construction test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system.

Written report to be submitted to CEO
Exceptions:

1. A duct air-leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope.

2. A duct air-leakage test shall not be required for ducts serving heat or energy recovery ventilators that are not integrated with ducts serving heating or cooling systems.

N1103.4 Duct leakage

Prescriptive: The total leakage of the ducts, where measured in accordance with Section R403.3.3, shall be as follows:
N1103.3.4 Duct Leakage **Prescriptive**

- 1. Rough in test:
  - The total leakage ≤ 4 cfm/100 sq. ft. of conditioned floor area where the air handler is installed at the time of the test,
  - The total leakage ≤ 3 cfm/100 sq. ft. of conditioned floor area where the air handler is **not** installed.

N1103.3.4 Duct Leakage **Prescriptive**

- 2. Post construction test:
  - Total leakage shall be ≤ 4 cfm/100 sq. ft. of conditioned floor area.

N1103.3.5 Building cavities **Mandatory**

- Building framing cavities **shall not** be used as ducts or plenums.
N1103.5.1 Heated water circulation and temperature maintenance systems. **Mandatory**
- Heated water circulation systems shall be in accordance with section R1103.5.1.1.
- Heat Trace Systems shall be in accordance with R1103.5.1.2
- Automatic controls required

N1103.5.3 Hot water pipe insulation **Prescriptive**
- Insulation for hot water pipe with a minimum thermal resistance of R-3 shall be applied.
- 7 specific situations listed
  - ≥ 3/4" nominal; serving > 1 dwelling unit; outside conditioned space; water heater to distribution manifold; under a floor slab; buried piping; in recirculation systems other than ‘demand recirculation systems’.

N1103.7 Equipment sizing and efficiency rating. **Mandatory**
Heating and cooling equipment **shall be sized** in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.
N1103.9 Snow melt system controls Mandatory

- Supplied through energy service
- Automatic controls
- Shut off when Pavement temp > 50°F and no precipitation
- Automatic or manual controls
  - Allow shutoff when outdoor temperature > 40°F

N1104 Electrical Power & Lighting Mandatory

- Not less than 90% of lamps in permanently installed lighting fixtures – high efficacy

  - N1104.1.1 – Fuel gas lighting, no continuous pilots

Student Exercise

- Using Chapter 11 of the 2020 RCNYS and
- The provided plans
- Check the proposal for compliance
  - Appendix pages ## & ##
### September 1, 2020

<table>
<thead>
<tr>
<th>Insulation amounts</th>
<th>Fenestration</th>
<th>U-36 Zone 4, U-32 Zones 5, 6</th>
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<tbody>
<tr>
<td></td>
<td>Skylight</td>
<td>U-58</td>
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<td>Glazing SHGC</td>
<td>0.40 Zone 4, NR Zones 5, 6</td>
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<td>Ceiling</td>
<td>R-49 Zones 4, 5, 6</td>
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<td></td>
<td>Wood wall</td>
<td>R-26 or R-13 = R-5 Zones 4 &amp; 5</td>
<td>5.1/2&quot; Batt Maybe</td>
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<td></td>
<td>Floor</td>
<td>R-19 Zone 4, R-30 Zones 5 &amp; 6</td>
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<td>Basement wall</td>
<td>R-15R-13 Zone 4; R-15R-19 Zones 5, 6; R-15R-20 Zone 6; Option 2</td>
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<td>Slab R, depth</td>
<td>R-15, 4 feet Zones 4, 5, 6</td>
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<td>Crawl space</td>
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### Energy Compliance

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<th>Compliance Materials</th>
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<td>International Energy Code</td>
<td>Simulated Performance</td>
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<td>Energy Rating Index</td>
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### Zone

<table>
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<th>5</th>
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---

Sheet A3.04L

---
Appears to be 2x6 common wall, but no insulation is specified

GENERAL NOTES
2x6 IT 72x8’x 10’ CC 24 FLR. STD & KITCH/BATH/GARAGE WALLS 6’X 10’ CC AN NON-INSULATED 6’X 10’ CC

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Code Section</th>
<th>Required/Allowed</th>
<th>Proposed</th>
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<tr>
<td>6</td>
<td>Energy - Prescriptive Paths</td>
<td>1103</td>
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<td>Systems Controls (Mandatory)</td>
<td>1103.1</td>
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<td>Programmable thermostat</td>
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<td>Duct insulation</td>
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<td>Duct sealing (Mandatory)</td>
<td>1103.3.2</td>
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<td></td>
<td>Duct testing (Mandatory)</td>
<td>1103.3.3</td>
<td>Not shown</td>
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<td>Mechanical Ventilation (Mandatory)</td>
<td>1103.6</td>
<td>Minimum 90%</td>
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<td>Equip. Sizing/Efficiency (Mandatory)</td>
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<td>Pools/Permanent Spas Covers</td>
<td>1103.10</td>
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<td>Lighting Systems</td>
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<td>High efficiency lamps (Mandatory)</td>
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<td>Lighting equipment (Mandatory)</td>
<td>1104.1</td>
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<td></td>
<td>Fuel Gas Lighting (Mandatory)</td>
<td>1104.1.1</td>
<td>N/A</td>
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</tbody>
</table>

---

Inspecting for Energy Code compliance
Things to look for,
Things to look **out** for...
Sheet A3.04L
- 5 ½” batt in walls
- R-30 blanket in ceiling
- FS-25 in basement

NOT SHOWN
- 5 ½” in the wall = R-19
- What is “FS-25”
- Glazing
- Garage wall insulation

“FS – 25”
R-15 value from product information
10’ below grade or to basement floor?

Air sealing
Compressed insulation behind pipe will not insulate properly. Same for electrical components.

Rim Joist must be insulated

Wall adjoining porch roof. Air barrier missing
Block and foam air sealing in chase

Use caulk or mastic to seal the penetrations.
A vapor retarder is required. What about the insulation? Check down here too.

---

**Chapter 11**
- Regulates the energy conservation requirements for Residential Code buildings
- Prescriptive provisions are provided
- Alternatives are available
- Next: Mechanical-Fuel Gas-Plumbing
Basic Training 9E The Residential Code

Lesson 11
Mechanical, Fuel Gas
Plumbing, Electric
Final Inspection

September 1, 2020

Equipment and Systems

Mechanical Chapters 12 - 23
Fuel Gas Code Chapter 24
Plumbing Chapters 25 - 33
Electrical Chapters 34 - 43

General requirements
M1303 Labeling of Appliances
A permanent factory applied nameplate(s) shall be affixed to appliances on which shall appear, in legible lettering the manufactures name or trade mark, the model number, a serial number and the seal or mark of the testing agency.
Mechanical

M1305.1 Appliance access for inspection service, repair and replacement.

• Shall be accessible for inspection, service, repair and replacement without removing permanent construction, other appliances.
• A level working space not less than 30 inches deep and 30 inches wide shall be provided in front of the control side to service an appliance.

Mechanical

M1306.1 Appliance clearance

• Shall be installed with the clearances from unprotected combustible materials as indicated on the appliance label and in the manufacturer’s installation instructions.
M1307.3 Elevation of ignition source.
Appliances having an ignition source shall be elevated such that the source of ignition is not less than 18 inches above the floor in garages.

Exception: This elevation is not required for appliances listed as flammable vapor ignition resistant.

M1401.3 Equipment and appliance sizing.
Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S or other approved sizing methodologies based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

• Exceptions

Chapter 15 Exhaust Systems
M1501.1 Outdoor discharge
The air removed by EVERY mechanical exhaust system shall discharge to the outdoors. Air shall not be exhausted in an attic, soffit, ridge vent or crawl space.
M1501.1 Outdoor discharge

Exception: Whole house ventilation type attic fans that discharge into the attic space of dwelling units having private attics shall be permitted.

M1502.1 General

Clothes dryers shall be exhausted in accordance with the manufacturer’s instructions.

M1502.3 Duct termination

Exhaust ducts shall terminate on the outside of the building. If the manufacturer’s instructions do not specify a termination location, the exhaust duct shall terminate not less than 3 feet in any direction from openings into the building.
M1503 Domestic Cooking Exhaust Equipment

M1503.1 General
Comply with this section

M1503.3 Exhaust Discharge
Discharge to the outdoors, not to an attic, or crawl space

Exception:
Listed and labeled ductless range hoods shall not be required to discharge to the outdoors.

Chapter 16 Duct Systems
M1601.4.1 Joints, seams and connections.
Joints, longitudinal and transverse seams and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes.
M1801.1 Venting required
Fuel burning appliances shall be vented to the outdoors in accordance with their listing and label and manufacturer’s instructions, except appliances listed and labeled for unvented use…

Polling Question
Section M1801.1 provides that gas-fired appliances shall be vented in accordance with?

a) The provisions of this chapter
b) The Fuel Gas Code
c) Chapter 24
d) None of the above

M1801.2 Draft requirements
A venting system shall satisfy the draft requirements of the appliance in accordance with the manufacturer's instructions, and shall be constructed and installed to develop a positive flow to convey combustion products to the outside atmosphere.
Mechanical
Chapter 20 Boilers and water heaters
M2001.1 Installation
In addition to the requirements of this code, the installation of boilers shall conform to the manufacturer’s instructions.

Mechanical
Chapter 22 SPECIAL PIPING & STORAGE
M2201.1 Materials
Supply tanks shall conform to UL 58 for underground and UL 80 for indoors.

Mechanical
M2202 Oil piping, fitting, connections
M2202.1 Materials
Piping shall consist of steel pipe, copper and copper alloy pipe and tubing or steel tubing conforming to ASTM A – 539.
M2202.2 Joints and fittings
Piping shall be connected with standard fittings compatible with the piping material.

M2203.3 Fill piping
Fill piping shall terminate outside of buildings at a point not less than 2 feet from any building opening at the same level or lower level.

M2203.4 Vent piping
Vent piping shall be not smaller than 1 ¼ inch pipe, piping shall be laid to drain toward the tank without sags or traps in which the liquid can collect.
M2203.5 Vent termination
Vent piping shall terminate outside the buildings at a point not less than 2 feet measured vertically or horizontally, from any building opening.

Chapter 24 Fuel Gas
Extracted from the Fuel Gas Code of NYS...
Modified to conform to the scope of the 2020 RCNYS
Numbers in parentheses are the corresponding sections of the FGCNYS.

Fuel Gas
SECTION G2411 (310) ELECTRICAL BONDING
G2411.1 (310.1) Pipe and tubing other than CSST.
Each above-ground portion of a gas piping system other than corrugated stainless steel tubing (CSST) that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas piping other than CSST shall be considered to be bonded where it is connected to an appliance that is connected to the equipment grounding conductor of the circuit that supplies that appliance.
### Fuel Gas

[NY] G2411.2 (310.2) Gas pipe bonding – CSST.  
Exception: All CJ-CSST use G2411.3  
[NY] G2411.2.1 (310.2.1) Bonding jumper.  
[NY] G2411.2.2 (310.2.2) Bonding clamp.  
[NY] G2411.2.2.1 (310.2.2.1) Bonding connections.  
[NY] G2411.2.2.3 (310.2.3) Prohibited uses.

### Fuel Gas

[NY] G2411.3 (310.3) Gas pipe bonding – listed AR-CSST.  
[NY] G2411.3.1 (310.3.1) Bonding.  
[NY]G2411.3.2 (310.3.2) Grounding electrodes.

### Fuel Gas

Section [NY] G2415.7 (404.7) Protection against physical damage.  
[NY] G2415.7 (404.7) Protection against physical damage.  
[NY] G2415.7.1 (404.7.1) Shield plates
Fuel Gas

**Section G2431 (General).** Sections G2432 through G2454 shall govern the approval, design, installation, construction, maintenance, alteration and repair of the appliances and equipment specifically identified herein.

Fuel Gas

**(NY) G2431.2 Flame safeguard device.**

All fuel gas space heating appliances installed or used in a building occupied as a residence shall be equipped with an automatic flame safeguard device that shall shut off the fuel supply to the main burner or group of burners when the flame or pilot light thereof is extinguished.

Polling Question

Shield plates shall comply with which standard?

a) The National Fuel Gas Code
b) ANSI LC-1
c) NFPA 58
d) NFPA 70
P2503.4 Building sewer testing:
The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer, filling the system with water and pressurizing the sewer to not less than 10-foot head of water. The test pressure shall not decrease during a period of not less than 15 minutes, the system shall be watertight at all points.

P2503.5 Drain, waste and vent systems testing:
Rough in and finished plumbing installations of drain, waste and vent systems shall be tested in accordance with Sections P2503.5.1 and P2503.5.2.
Plumbing

P2503.6 Shower Liner Test
For site built showers
• Pipe drain plugged
• Water depth, 2” minimum
• 15 minutes minimum duration

Plumbing

P2503.7 Water Supply system testing:
• Not less than working pressure of system
• For other than plastic, air test ≥ 50 psi,
• 15 minute minimum without loss of pressure
• Water tests shall use potable water
• Exception: For PEX piping systems
Plumbing

Chapter 26 General Plumbing Requirements

[NY] P2602.1.1 Individual water supplies
- Well driller registered with NYSDEC
- Well per 10NYCRR Appendix 5-b
- (NYS Dept of Health regulations)

[NY] P2602.1.2 Individual sewage treatment system
- Per 10NYCRR Appendix 75-A
- (NYS Dept of Health regulations)
- NYSDEC
- NYCDEP
- Adirondack Park Agency
- Local County Health Departments
- Other applicable statutes, local laws, ordinances or regulations
Chapter 28 Water heaters

P2801.1 Required
Hot water shall be supplied to plumbing fixtures and plumbing appliances intended for bathing, washing or culinary purposes.

P2801.6 Required pan
Where a storage tank type water heater or a hot water storage tank is installed in a location where water leakage from a tank will cause damage, the tank shall be installed in a pan constructed of one of the following:

1. Galvanized steel or aluminum of not less than 0.0236 inch in thickness.
2. Plastic not less than 0.036 inch in thickness.
3. Other approved materials.

A plastic pan beneath a gas-fired water heater shall be constructed of material having a flame spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723.
P2801.6.1 Pan size and drain:
The pan shall be not less than 1 ½ inches deep and shall be sufficient size and shape to receive dripping or condensate from the tank or water heater.

Polling Question
Where a storage tank type water heater or a hot water storage tank is installed in a location where water leakage from a tank will cause damage, the tank shall be?

a) Sealed against water leakage
b) Relocated to an alternate location
c) An electric water heater
d) Installed in a pan

P2801.7 Water heaters installed in garages:
... ignition source shall be elevated not less than 18 inches above the garage floor.

Exception: Elevation is not required for... listed as flammable vapor ignition resistant.
[NY] P2902.1 General.
- Potable water systems
- Installed to prevent contamination
- Subpart 5-1.31 NYS Sanitary Code (10NYCRR 5-1)

[NY] P2902.3 Backflow protection
- Per P2902.3.1 through P2902.3.6
- Table P2902.3 On-site containment per 10NYCRR may be required

[NY] Table P2902.2

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>Maximum Flow Rate</th>
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<tbody>
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<td>Lavatory</td>
<td>1.5 gpm at 40 ps</td>
</tr>
<tr>
<td>Showers</td>
<td>2.0 gpm at 40 ps</td>
</tr>
<tr>
<td>Sink</td>
<td>3.2 gpm at 40 ps</td>
</tr>
<tr>
<td>Water closet</td>
<td>1.28 gallons per flushing cycle</td>
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For SI: 1 gpm = 3.785 liters
1 ps = 0.069 bar

Notes:
- a. All flush valves (not on a lavatory assembly) shall be designed to fit a 2-inch x 4-inch x 4-inch space
- b. Consumption increases shall be documented by a licensed plumber

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Department of State

A Division of New York
Department of State

A Division of New York
Department of State
Chapter 30 Sanitary drainage: P3001.2 Protection from freezing.
No portion of the above grade DWV system, other than vent terminals, shall be located outside of a building, in attics or crawl spaces, concealed in outside walls, or any other place subjected to freezing temperatures.

P3002.2 Building sewer
Piping shall be as shown in Table P3002.2. Forced main sewer piping shall conform to one of the standards for ABS plastic pipe, copper or copper alloy tubing.

P3005.2 Cleanouts required.
Cleanouts shall be provided for drainage piping in accordance with Sections P3005.2.1 – P3005.2.11
Chapter 31 Vents

P3101.2.1 Venting required

Every trap and trapped fixture shall be vented in accordance with one of the venting methods specified in this chapter.

P3102 Vent stacks and stack vents:

P3102.1 Required vent extension

The vent system serving each building drain shall have not less than one vent pipe that extends to the outdoors.

P3103.1.4 Sidewall Vent Terminal.

Vent terminals extending through the wall shall terminate not less than 10 feet (3048 mm) from a lot line and not less than 10 feet (3048 mm) above the highest grade elevation within 10 feet (3048 mm) in any direction horizontally of the vent terminal. Vent pipes shall not terminate under the overhang of a structure where the overhang includes soffit vents. Such vent terminals shall be protected by a method that prevents birds and rodents from entering or blocking the vent pipe opening and that does not reduce the open area of the vent pipe.
Plumbing

P3103.5 Location of vent terminal. An open vent terminal… shall not be located less than 4 feet directly beneath any door, openable window, or other air intake opening of the building or of an adjacent building, nor… within 10 feet horizontally… unless it is not less than 3 feet above the top of such opening.

P3109 Waste Stack Vent
A waste stack shall be considered a vent for all of the fixtures discharging to the stack where installed in accordance with the requirements of section 3109.

Chapter 32 Traps
P3201.5 Prohibited trap designs
The following types of traps are prohibited.
1. Bell traps
2. Separate fixture traps with interior partitions
3. “S” traps
4. Drum traps
5. Trap designs with moving parts.
**Electrical**

**[NY] E3401.2.1 Owner Occupied one-family dwellings.** Owner occupied one-family dwellings and accessory structures shall not be required to be provided with electrical power, wiring, devices and equipment, subject to the approval of the code enforcement official. If an on-site electrical power system is installed or used, all electrical wiring, devices and equipment in such system shall comply with Part VIII – Electrical of the IRC.

---

**Polling Question**

Owner-occupied one-family dwellings are not required to be provided with electrical power from a commercial source, and if provided with on-site power shall?

a) Be permitted to provide only what the owner wants
b) Not be required to comply with the Code
c) Comply with Part VIII of the Code
d) Only be required to comply with Chapter 36
**E3403.2 Inspection required**

New electrical work and parts or existing systems affected by new work or alterations shall be inspected by the building official to ensure compliance with the requirements or chapters 34-43.

**E3405.2 Working clearances for energized equipment and panel boards.**

Except as otherwise specified in chapters 34-43, the dimension of the working space in the direction of access shall be not less than 36 inches in depth… not less than 30 inches wide… and not less than the width of such equipment.

Exceptions:

1. In existing dwelling units, service equipment and panel boards that are not rated in excess of 200 amperes shall be permitted in spaces where the height of the working space is less than 6.5 feet.
2. Meters that are installed in meter sockets shall be permitted to extend beyond other equipment. Meter sockets shall not be exempt from the requirements of this section.
Electrical

[NY] E3609.7 (Bonding other metal piping).

Exception: Gas piping systems that contain corrugated stainless steel tubing (CSST) shall be installed and bonded in accordance with Section G2411 of this code.

Chapter 37 Branch circuit and feeder requirements.

E3703.2 Kitchen and dining area receptacles. A minimum of two 20 ampere rated branch circuits shall be provided to serve all wall and floor receptacle outlets located in the kitchen, pantry, breakfast area, dining area or similar area of a dwelling.

The kitchen countertop receptacles shall be served by a minimum of two 20 ampere rated branch circuits, either or both of which shall also be permitted to supply other receptacle outlets in the same areas including receptacle outlets for refrigeration appliances.
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Department of State

Electrical

Exception: The receptacle outlet for refrigeration appliances shall be permitted to be supplied from an individual branch circuit rated 15 ampere or greater.

E3703.3 Laundry circuit:
A minimum of one 20 ampere rated branch circuit shall be provided for receptacles located in the laundry area and shall serve only receptacle outlets located in the laundry area.

E3703.4 Bathroom branch circuits:
A minimum of one 20 ampere branch circuit shall be provided to supply bathroom receptacle outlets. Such circuits shall have no other outlets.

Exception: Where 20 ampere circuit supplies a single bathroom, outlets for other equipment within the same bathroom shall be permitted to be supplied in accordance with Section E3702.
Electrical

E3706.2 Panel board circuit identification:
All circuits and circuit modifications shall be legibly identified as to their clear, evident, and specific purpose of use. The identification shall be included in a circuit directory located on the face of the panel board enclosure or inside the panel door.

Chapter 39 Power and lighting distribution:
E3901.2 General purpose receptacle distribution:
In every room the outlets shall be installed in accordance with the general provisions specified in Sections E3901.2.1- E3901.2.3.
E3901.2.1 Spacing:
Receptacles shall be installed so that no point measured horizontally along the floor line of any wall space is more than 6 feet for a receptacle outlet.

Translation: Maximum of 12’ apart

E3901.2.2 Wall space:
As used in this section, a wall space shall include the following.
1. Any space that is 2 feet or more in width, including space, measured around corners, and that is unbroken along the floor line by doorways and similar openings, fireplaces, and fixed cabinets.
2. The space occupied by fixed panels in exterior walls, excluding sliding panels.
3. The space created by fixed room dividers such as railings and freestanding bar type counters.

E3901.2.3 Floor receptacles:
Receptacle outlets in floors shall not be counted as part of the required number if receptacles except where located within 18 inches of the wall.
E3901.4.1 Wall countertop space:
A receptacle shall be installed at each wall countertop space 12 inches or wider. Receptacles shall be installed so that no point along the wall line is more than 24 inches.

Exception: Behind range, counter-mounted cooking unit, or sink

Translation: No more than 4’ apart

E3901.4.2 Island countertop spaces:
At least one receptacle outlet shall be installed at each island countertop space with a long dimension of 24 inches or greater and a short dimension or 12 inches or greater.

Polling Question
Receptacles at wall countertops shall be installed so that no point along the wall is more than ___ inches from a receptacle?

a) 24"
b) 30"
c) 36"
d) 48"
E3901.6 Bathroom:  
At least one wall receptacle outlet shall be installed in bathrooms and such outlet shall be located within 36 inches of the outside edge of each lavatory basin.

E3901.7 Outdoor outlets:  
Not less than one receptacle outlet that is readily accessible from grade level and located not more than 6 feet, 6 inches above grade...at the front and back of each dwelling unit...

E3901.8 Laundry areas:  
Not less than one receptacle outlet shall be installed in areas designated for the installation of laundry equipment.
Electrical

E3901.9 Basements, garages and accessory buildings:
Not less than one receptacle outlet...
Detached garage or shed, only when supplied with electrical power

Electrical

E3902 Ground fault and arc fault circuit interrupter protection:
E3902.1 Bathroom
E3902.2 Garage and accessory building
E3902.3 Outdoor receptacles
E3902.5 Unfinished basement
E3902.6 Kitchen countertop surfaces
E3902.7 Sink
E3902.8 Bathtub or shower stall
E3902.9 Laundry areas.
E3902.10 Kitchen dishwasher branch circuit

Electrical

All areas shall have ground fault circuit interrupter protection for personnel.
Within 6’ of edge of sink, tub, shower
E3902.16 Arc fault circuit interrupter protection:
Receptacles installed in kitchens, family rooms, dining rooms, living room, parlors, libraries, dens, bedrooms, sunrooms, recreations rooms, closets, hallways, laundry areas and similar rooms or areas shall be protected by any of the following:

E3903 Lighting Outlets
E3903.2 Habitable room:
At least one wall switch controlled lighting outlet shall be installed in every habitable room, kitchen and bathroom.
Exceptions:
1. In other than kitchens and bathrooms, one or more receptacles controlled by a wall switch shall be considered equivalent.
2. Lighting outlets shall be permitted to be controlled by occupancy sensors.

Chapter 40 Devices and Luminaires
E4003.12 Luminaires in clothes closets.
Minimum clearance to combustible materials.
Chapter 41 Appliance Installation

E4101.2 Installation:
Appliances and equipment shall be installed in accordance with the manufacturer's installation instructions.

Student exercise

Using pages 1, 2 and 3 of Form #5 and
• The plans and
• The 2020 RCNYS with
Review the Mechanical, Fuel Gas and Plumbing systems for the proposed dwelling.
### Rumehouse

#### Fuel Gas
- General (installation requirements)
- Combustion/ventilation/dilution air installation
- Electrical
- Electrical Bonding
- Gas pipe bonding – CSST
- Bonding – Listed AR-CSST
- General (system requirements)
- Pipe sizing
- Piping materials
- Protection against damage
- Piping support
- Drains and vented piping
- Shutoff valves
- Appliance connections
- Piping support internals
- General (Clamps/vents)
- Vents
- Venting of appliances
- Factory-built chimneys
- General (Appliance installations)
- Flame safeguard device

#### Plumbing/Sanitation
- Fixtures Required
- Toilet fixture
- Kitchen fixture
- General Plumbing Requirements
- Individual water supply & sewage disposal
- Plumbing fixtures
- Water heaters
- Water supply & distribution
- General
- Backflow prevention
- Sanitary drainage
- Vents
- Traps
- Storm drain

#### Electrical Requirements
- Owner occupied SF D
- Bonding other metal pipe
- Receptacle Placement
- Small appliance circuits
- GFCI and Arc Fault
- Switch Locations
- NFPA 70-14 (NEC)
- Exempt subject to GEO
- CSST Bonded per G2411
- 12 ft. max (4’ at kitchen)
- 2 - 20 amp
- GFCI 10 locations
- Arc Fault all circuits
- 1 per habitable room & bathrooms

---

**Notes:**
- N/A: Not applicable
- OK: Satisfactory
- Not Shown: Not shown on plans
- Generally OK: Generally OK
- Generally Not Applicable: Generally Not Applicable
- Building Standards and Codes
September 1, 2020

The Exterior Final

Exterior finish complete
Proper slope of grading
Emergency egress window wells

September 1, 2020

Exterior inspection items may include:
- Chimney
- B-Vent
- Direct Vent
- Height
- Location
- Installation of equipment
- Sealing of penetrations

September 1, 2020

Fresh air intakes and exhaust
- Fireplaces, Heaters, Boilers
Rails on stairs
Guards on decks and porches over 30” high
Treads, risers
Opening limits

Plumbing vent extensions
Size
Height
Flashings

Meter locations
Bathroom exhaust terminal locations

Garage Final

Fire separation
Door,
Frame and Closer
Walls and ceiling
Seams taped
Corners too
Steps
Handrail

The Basement Final

Emergency shut-off for furnace
Stairway
Landing inside door
Risers and treads
Handrails
Proper lighting

Basement insulation
Plumbing main drain

Water main
Main shut off
Back flow prevention
Grounding
Min ¾" line
Heating equipment
If high efficiency heating unit is used or
If air conditioning coil is installed, a condensate pump will probably be installed
Must drain to an approved location

Venting must be installed to manufacturer’s specifications
Duct work is within insulation package, does not need to be insulated

High efficiency water heater with a power vent installed to manufacturer’s specifications
All bearing posts must be properly installed including being secured in place
Check for proper rating on posts
All joints in bearing beams must be over bearing points

All electrical equipment including the service panel must be inspected for compliance with the NEC/NFPA 70
Check for proper clearance in front of panel:
6'6" high
30" wide
36" out from wall
Circuits labeled

Gas piping must be properly sized for the demand of all equipment
All gas piping must be installed using only approved materials
CSST per NYS Requirements
The Final Inspection Living Area

- Finished stairs
- Railings
- Height
- Secure
- Location
- Rise
- Run
- Width
- Headroom
- Baluster spacing

Doors
- Hardware
- Close
- Latch

Windows
- Installation
- Operation
- Egress
- Trim
- Wall finish
- Flooring

EERO windows
- Finish
- Outlet spacing
- Ceiling light or a switched outlet
Smoke Alarms
Installed to manufacturer’s specifications
In every bedroom
Outside of and adjacent to every bedroom
On each floor level
All interconnected

Don’t forget the Carbon Monoxide Alarms

Bathrooms

Light
Ventilation
At least one
Toilet
Sink
Tub/Shower
Hot water

• Fixtures installed properly
• Fixtures meet all code requirements
• Labeled
Anti Scald Valves
120°F maximum

Other Rooms
Living Room/Parlor
Dining Room

Loft
The open railing allows ‘borrowed’ light and ventilation for the loft.
More recessed lights!
Are these in the Building Envelope?

Family Room

Summary

• The 2020 RCNYS
• Provides requirements for Mechanical, Fuel Gas and Plumbing systems for Residential Code buildings.
• The plans provided some but not all of the necessary information to insure code compliance
• Next: Appendix J, Existing Buildings
Lesson 12
Appendix J
Existing Buildings
and Structures

Common Issues

• Are Permits Required?
• Which Code Requirements apply?
• Are stamped plans required?
• Does the energy code apply?
• Are there More Restrictive Local Standards?
General Rules of Appendix J

- Existing LEGAL occupancy may remain
  - Cannot legalize unlawful occupancy (AJ 102.3)
- New work = new construction standards
  - With exceptions
- More work increases compliance requirements
  - Repairs → Replacement

Section AJ102.1.1

- New work MUST comply with Code
- But the existing structure doesn’t need to unless specifically stated
  - Specifically stated examples:
    - Smoke alarms
    - Carbon monoxide alarms
    - Sprinklers

Section AJ102.5 - Home Occupations

- Described and limited through CONDITIONS:
  - Within primary structure
  - Meets habitable space requirements
  - Maximums:
    - 15% of total bldg. floor area
    - one outside employee
    - inventory storage 50% of home occupation area
  - No operation that is considered hazardous
- Superseded by more restrictive lawful zoning
Home Occupation?

What if the limits of AJ102.5.1 are exceeded?
• Regulated through the 2020 BCNYS as:
  – Mixed non-separated use, or
  – Mixed separated use
• Possible compliance issues
  – Change of use under the 2020 EBCNYS
    • Sprinklers may be required
  – Accessibility
• **AJ104 Energy Efficiency**
  • Additions, Alterations, Repairs
    – Comply with Section N1107 (in the 2020 RCNYS)
      • Allowed exceptions per N1101.1:
        • The following need not comply if energy use is not increased:

• **AJ 104.1**

• **N1101.1 Exceptions:**
  – Storm windows over existing
  – Glass only replacement in existing sash and frame
    • U-factor and SHGC equal to or lower than original glass
  – Roof/ceiling, wall or floor cavities,
    – Insulate full depth with R-3/inch or better if opened
  – Walls and floors without framing cavities
  – Reroofing where insulation not exposed
  – Replacement of existing doors, no new vestibule required
  – < 50% of luminaires replaced, and no increase in energy use
  – Bulb and ballast replacement, no increase in energy use

**AJ104.1.3 – Change in space conditioning.**
Any non-conditioned space that is altered to become conditioned space shall comply with Section N1109.2 of this code.

Translation:
A previously unconditioned basement that is converted to conditioned space requires compliance with Chapter 11 of the RCNYS. Same would be true for an unfinished attic changed to living space.
N1107 Existing Buildings – General

• N1107.1.1 Additions, alterations, or repairs comply with:
  – N1108 (Additions),
  – N1109 (Alterations),
  – N1110 (Repairs)

• New work = new construction standards
• Unaltered allowed as is

N1108.1 (Additions) General

• Addition shall comply as new
  – Addition alone or
  – Addition plus existing or
  – Where addition plus existing uses no more energy

Polling Question

Where an existing building plus an addition uses no more energy than the existing building did prior to the addition, the building shall?

a) Comply with only Section N1106
b) Comply with the Energy Code
c) Deemed in compliance with this chapter
d) Exempt from the requirements of the Residential Code
• N1108.1.1 Prescriptive Compliance
  • Building envelope
    - New assemblies meet new provisions
  • Heating and Cooling Systems
    - New systems meet new provisions
  • Service Hot Water Systems
    - New systems meet new provisions
  • Lighting
    - New lighting meet new provisions
• N1108.1.2 Existing plus addition compliance
  - Simulated performance alternative allowed

• N1109.1 (Alterations) General
  • Shall not make the building less conforming
  • Unaltered portions can remain
  • Shall not create unsafe or hazardous condition
    - Or overload existing systems
  • Shall not increase energy usage

• N1109.1.1 Building envelope
  • Altered portions comply as new
    - Exceptions:
      » Storm windows over existing
      » Existing cavities exposed
      ▪ fill with insulation
      » Unexposed cavities OK
      » Roof recover
      » Roofs where cavity is exposed shall be insulated
      » Surface applied window film
      » Less than 50% of luminaires if energy use not increased
• N1109.1.1 Replacement fenestration
  • New fenestration units to comply as new
    – Where sash and glazing are replaced
      » Meet U-factor and SHGC
    » If more than one replaced, allows area weighted average

• R1109.1.2 Heating and Cooling Systems
  • New systems comply with new provisions
    – Exception: Ducts extended less than 40’ into unconditioned space need not be tested
  • N1109.1.3 Service hot water systems
  • New systems comply with new provisions
  • N1109.1.4 Lighting
  • New lighting comply with new provisions
    – Exception: Less than 50% replaced and no increase in usage

• N1109.2 Change in space conditioning
  • Non-conditioned or low energy space altered to become conditioned space requires full compliance with this chapter
    – Exception: Simulated performance option permitted to be 110% of annual energy cost otherwise allowed by N1105.3
• **N1110.1 (Repairs) General**
  - Comply with 1107.3, Maintenance
    - Not classified as an ‘alteration’
      » Routine maintenance &
      » Ordinary repairs otherwise exempt from permits
      » Abatement due to wear
    - Not subject to this section

• **N1110.2 Application**
  - The following shall be considered repairs
    - Glass only replacement in existing sash/frame
    - Roof repairs (see definitions)
    - Bulb and ballast with no increase in usage
    - Replacement exterior door won't require a new vestibule
      » Maintain any existing vestibule

• **N1111 Change of Occupancy or Use**
  - Increase in non-renewable energy demand
    - Full compliance with ‘this chapter’.
  - Space converted to dwelling unit or portion of
    - Full compliance with ‘this chapter’
      » Exception: Simulated performance option
        - Allows 110% of N1105.3 annual cost
• **AJ105 Preliminary Meeting**
  – CEO is authorized to require
    • Establish specific applicability of the provisions of this Appendix

• **AJ106 Evaluation of an Existing building**
  – CEO authorized to require
    • Investigated and evaluated by an RDP
    • Based on preliminary meeting
    • Shall include but not be limited to:
      – Structural, mechanical, plumbing, heating
    – Limited to areas directly affected by proposal
    • Certified by RDP

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**Polling Question**

Which of the following statements is true regarding Sections AJ105 and AJ106?

a) A code official may request either a preliminary meeting or an evaluation but not both
b) A preliminary meeting is the applicant’s choice
c) The Code Official must prepare the evaluation
d) The Code Official may require both a preliminary meeting and an evaluation
• AJ202 General Definitions
  – Addition
  – Alteration
  – Bed and Breakfast Dwelling
  – Change of Occupancy
  – Conversion – specific to B & B
  – Dangerous
  – Equipment or Fixture
  – Existing Building
  – Flood Hazard Area

• AJ202 General Definitions
  – Historic Building
  – Home Occupation
  – Load-bearing Element
  – Materials and Methods Requirements
  – Rehabilitation
  – Relocation
  – Repair
  – Replacement

• AJ202 General Definitions
  – Substantial Damage
  – Substantial Improvement
  – Substantial Structural Damage
  – Unsafe Building or Equipment
  – Work Area
• **AJ3 Classification of Work**
  – **AJ301 General**
    • **AJ301.1 Scope**
      – Work shall be classified per this section
    • **AJ 301.2 Work Area**
      – Work area shall be identified on plans

• **AJ301.3 Repairs**
  – Patching or restoration of
    • Materials, elements, equipment, or fixtures
  – For the purpose of maintaining
  – Shall comply with AJ401

• **AJ301.4 Alterations – Level 1**
  – Removal and replacement or covering of
    • Existing materials, elements, equipment, or fixtures
  – Using new materials, elements, etc
    • That serve the same purpose
    • **Without** reconfiguring space
  – Shall comply with AJ501
• **AJ301.5 Alterations – Level 2**
  
  – Includes the reconfiguration of space
  – The addition or elimination of any door or window
  – Reconfiguration or extension of any system
  – Installation of additional equipment
  – Comply with AJ501 and AJ601

  *Exception: Work areas in which the alteration work is exclusively plumbing, mechanical or electrical shall not be included in the computation of total area of all work areas.*

• **AJ301.6 Change of Occupancy**
  
  – As defined in AJ202
  – Comply with AJ701

• **AJ301.7 Additions**
  
  – As defined in AJ202
  – Comply with AJ801

• **AJ301.8 Historic Buildings**
  
  – As defined in AJ202
  – Except as specifically provided for in AJ9, shall comply with applicable provisions of this appendix for the type of work performed
• AJ301.9 Relocated Buildings
  – As defined in AJ202
  – Shall comply with AJ1001

• AJ301.10 Replacement
  – As defined in AJ202
  – Shall comply with AJ1101

• Summary
  – Appendix J of the 2020 RCNYS provides requirements for when work is done to an existing Residential Code building
  – It is similar to the Existing Building Code
  – It includes specific provisions for
    • Home Occupations
    • Bed & Breakfast Dwellings

Course Summary
This course has taken us from, learning the code, to conducting a plan review, to performing the required inspections
Although this course did not cover every topic in the Residential Code, it has given you a basic understanding of how to use the 2020 RCNYS
Remember if you need any assistance in the future you can call your regional office or the Albany office
Now the best part of the course…