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Significant changes in the 2018 Virginia Residential Code

HENRICO COUNTY
Department of Building Construction and Inspections

Virginia Residential Code

- The Virginia Residential Code (VRC) combines the 2018 International Residential Code (IRC) and the 2018 Virginia amendments in one document

- The VRC is published by the International Code Council and is available from www.ICCsafe.org

Chapter 2

New Definitions

Accessory Dwelling Unit (ADU)

- A dwelling unit, on the same lot, that is accessory to the primary residence with separate living, sleeping, eating, cooking and sanitation
- May share living space, utilities
- Return air within two-family dwellings are permitted to discharge into either dwelling unit (M1602.2.7)
- Even though it may share a means of egress with the primary dwelling, an ADU must have a code compliant means of egress
- For one or more occupants

Chapter 2

New Definitions

Accessory Dwelling Unit (ADU)

- No fire separation required between dwelling units (R302.3 Exception #3)
- Fire alarm systems can be installed in lieu of smoke alarms if the actuation of an alarm will activate all notification appliances within both dwelling units (R314.7)
- Where a fire alarm system is installed, it shall become a permanent fixture of the dwelling unit (R314.7.3)
- Carbon monoxide alarms in each dwelling unit to be interconnected or use a listed wireless alarm (R315.5)

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Chapter 2

New Definitions

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Accessory Dwelling Unit (ADU)

ATTACHED

Shares at least one wall with the primary home

INTERIOR CONVERSION

Built from existing converted space (e.g., an attic or a basement)

ABOVE GARAGE

Unit built above garage

GARAGE APARTMENT

Converted former garage space

New Definitions

Carbon Monoxide Alarm & Carbon Monoxide Detector

- Must be interconnected if there is more than one alarm in the dwelling
- Can be a listed wireless alarm

Chapter 2

New Definitions

Crawl Space

- Underfloor space that is not a basement
- This term is used frequently in the code, however it was not previously defined in the code
- Clarifies situations where it's unclear if an area is a basement or a crawl space
- By definition a basement is a story that is not above grade plane

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Chapter 2

New Definitions

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Dwelling Unit

- Definition is not new but was changed to now incorporate consideration of an accessory dwelling unit
- Any building that contains one or two dwelling units, or one dwelling unit and one accessory dwelling unit, used, intended or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes

Chapter 2

New Definitions

Two-Family Dwelling

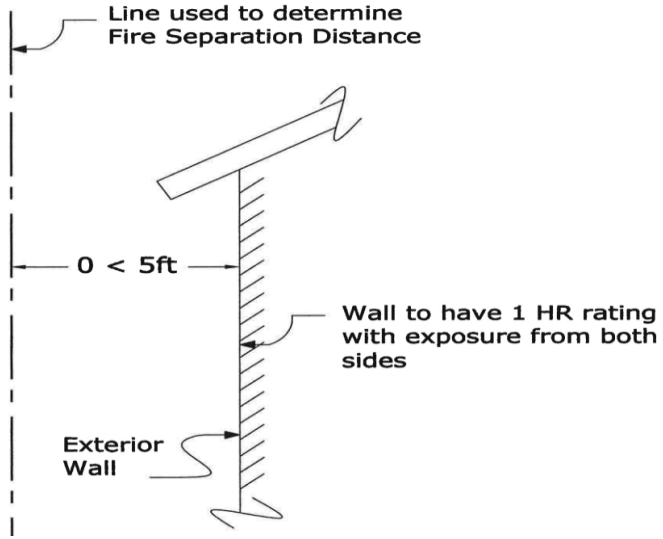
- A dwelling that includes two-dwelling units or a dwelling unit and one accessory dwelling unit
- This means that there are now two types of two-family dwellings, one with two dwelling units, and one with a single dwelling unit and an accessory dwelling unit

Chapter 3

Building Planning

Fire Resistant Construction
Table R302.1(1)
Exterior Walls

- Exterior walls require a 1 hr. rating when the Fire Separation Distance is between 0 ft to < 5 ft
- Only the distance value was changed, however the final end result has not changed



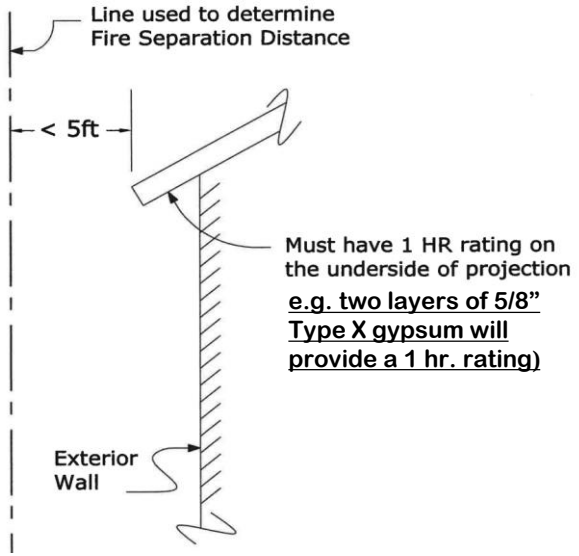
Chapter 3

Building Planning

Fire Resistant Construction
Table R302.1(1)
Projections

- Previous code edition did not allow any projections that were within 0 ft to < 2 ft from the line used to determine the fire separation distance

- Projections are now allowed from 0 ft to < 5 ft from the line used to determine the fire separation distance if they have a 1 hr. rating to the underside, or are constructed of heavy timber or fire-retardant-treated wood



Projections located ≥ 5 ft from the line used to determine the fire separation distance do not have to be rated

Building Planning

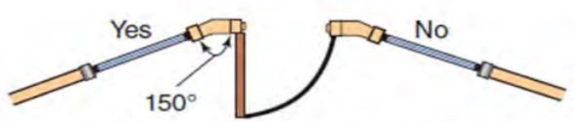
Two-family dwellings - R302.3 Exception #3

- Fire-resistant-rated assemblies are not required to separate a dwelling unit and *an accessory dwelling unit* located on the same lot
- However, dwelling units in two-family dwellings must be separated from each other by 1 hr. fire-resistant-rated walls and/or floors

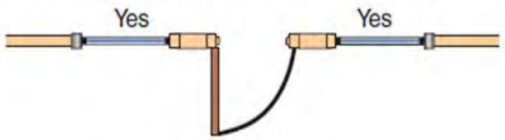
Building Planning

Glazing adjacent to doors R308.4.2.2

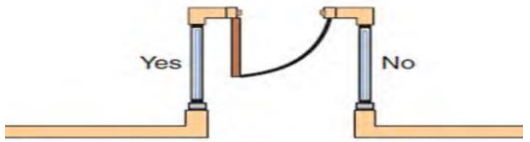
- Replaced the term “perpendicular” with *“less than 180 degrees from”* the plane of the door in a closed position and within 24 inches of the hinge side of an in-swinging door to include windows installed at an angle.



Angle less than 180 degrees from plane of door



In same plane as door



90 degree angle to plane of door

“Yes”, designates where safety glazing is required

Adjacent to door

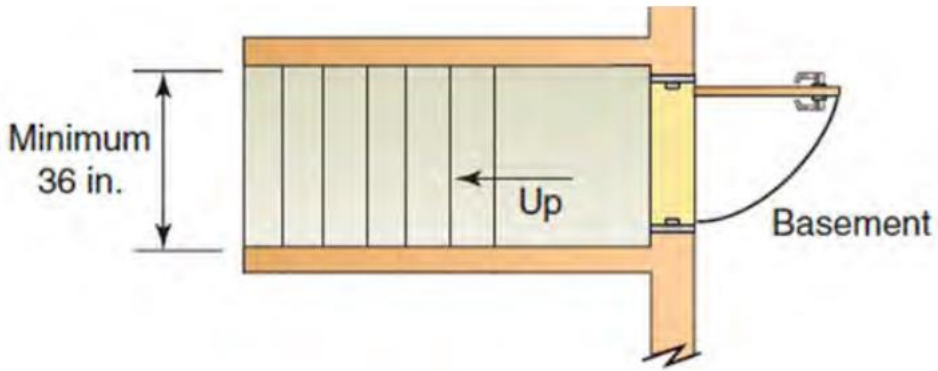
Building Planning

Area Wells – R310.3.2

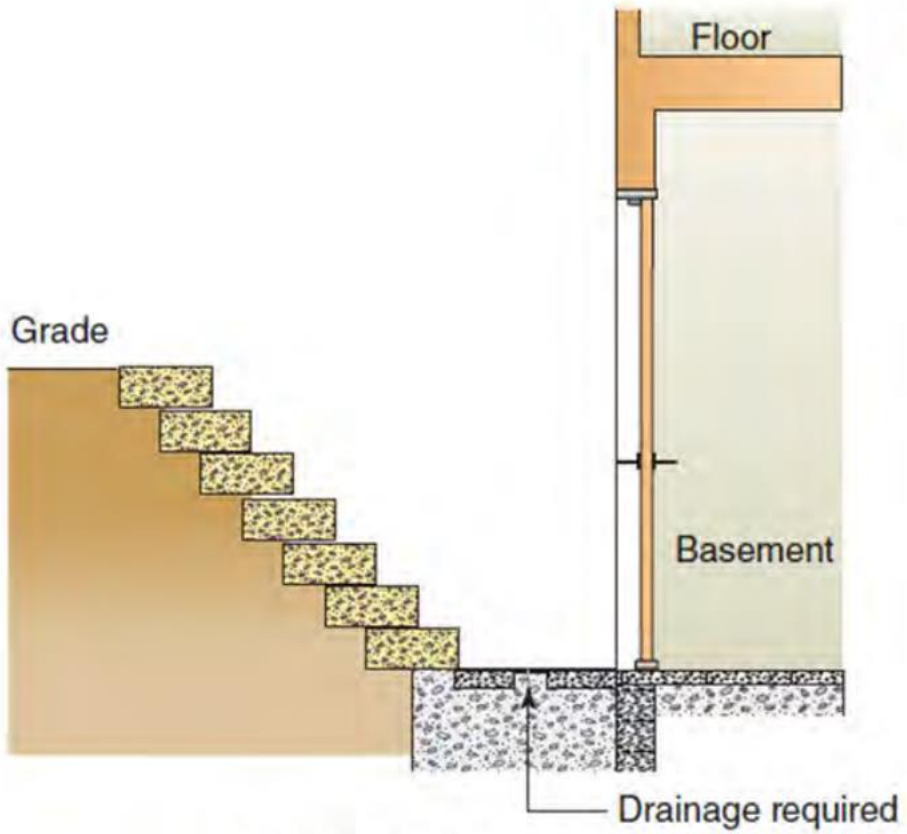
- Changed terminology from ‘bulkhead enclosure’ to **“area wells”**
- Area wells are similar to window wells except that they utilize a door as the opening for emergency escape and rescue (EERO)
- Provisions for ladders and steps for area wells have been added (provisions for ladders are same as for a window well)
- Area well must have a min. width of 36”
- Door can be side hinged or sliding
- Door swinging into the area well must be fully openable

Building Planning

Area Wells – R310.3.2



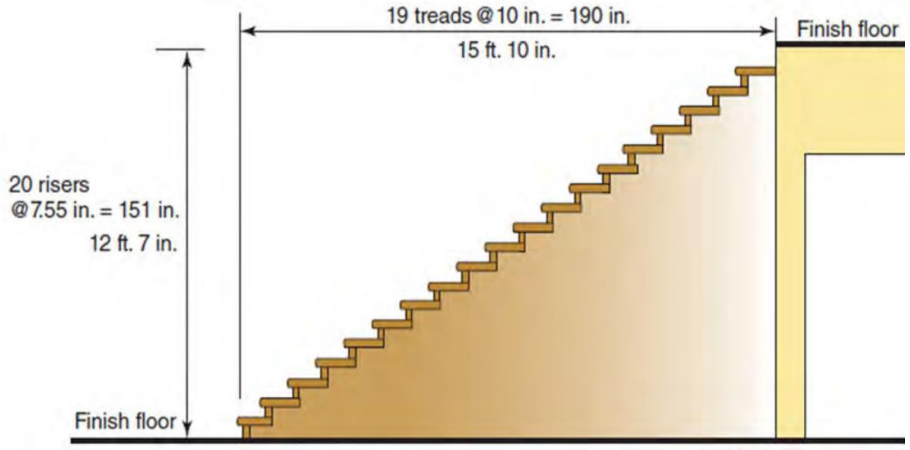
Plan view



Section view of area well

Building Planning

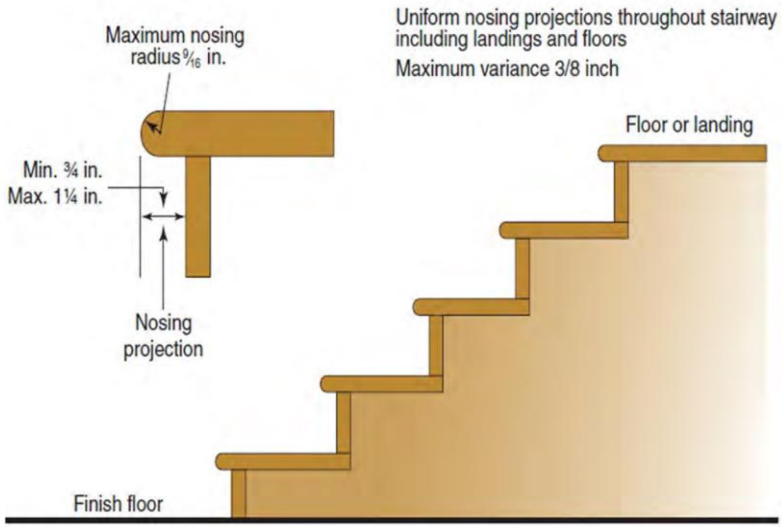
Vertical Rise – R311.7.3



- Maximum stair rise between landings increased by 4 inches to 151 inches
- Increases the maximum height of stairway before a landing would be required
- Provides greater flexibility for stairway construction. Allows for 10 ft. walls and 2 ft. high truss systems which are more frequently used in today's construction

Building Planning

Nosings – R311.7.5.3

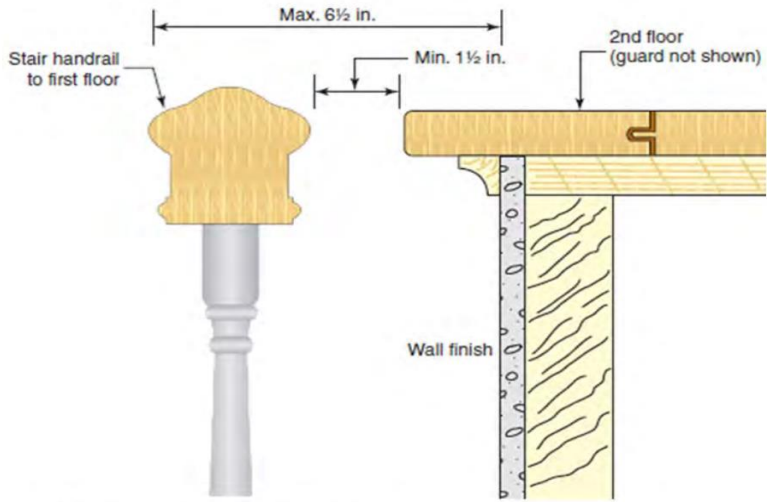


Stairway nosing requirements

- Clarifies that nosings must be consistent throughout the stairway
- Allowable tolerance of 3/8” for nosings in a flight of stairs
- Nosings projection: ¾” minimum; 1 ¼” maximum
- The greatest nosing projection shall not exceed the smallest by more than 3/8” within a stairway
- Requirements apply to landings and floors serving stairway and not just the nosing of the stair treads

Building Planning

Handrail Projection Exception – R311.7.8.2

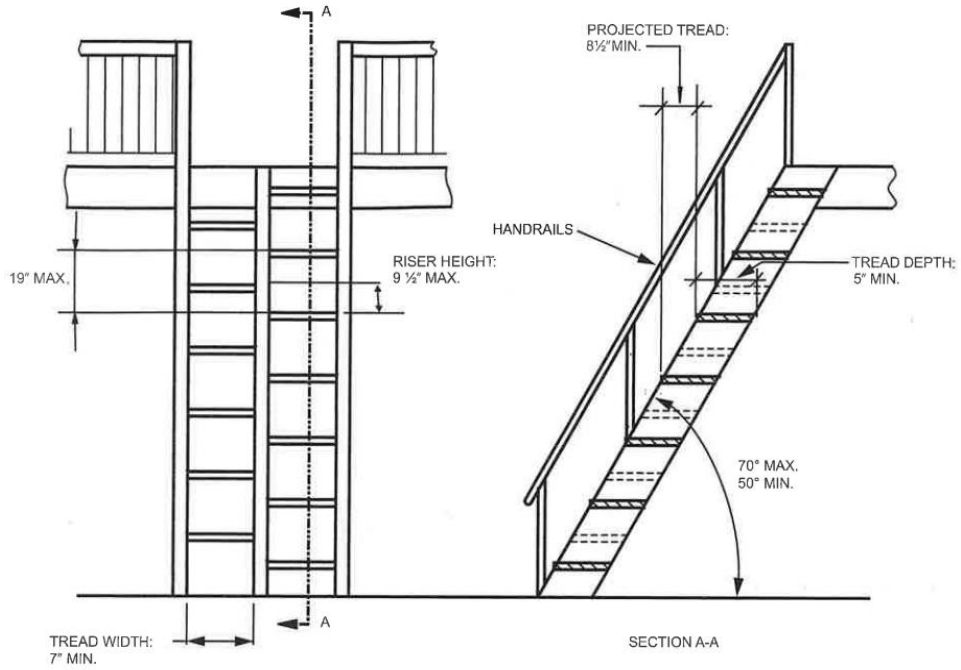


Greater projection allowed where handrail passes a floor nosing

- Added new exception allowing for a maximum handrail projection of 6 ½” when it passes a projection of a floor, landing or tread return
- Provides for adequate clearance of 1 ½” for grasp ability of the handrail
- Minimum stair width of 36” must still be maintained

Building Planning

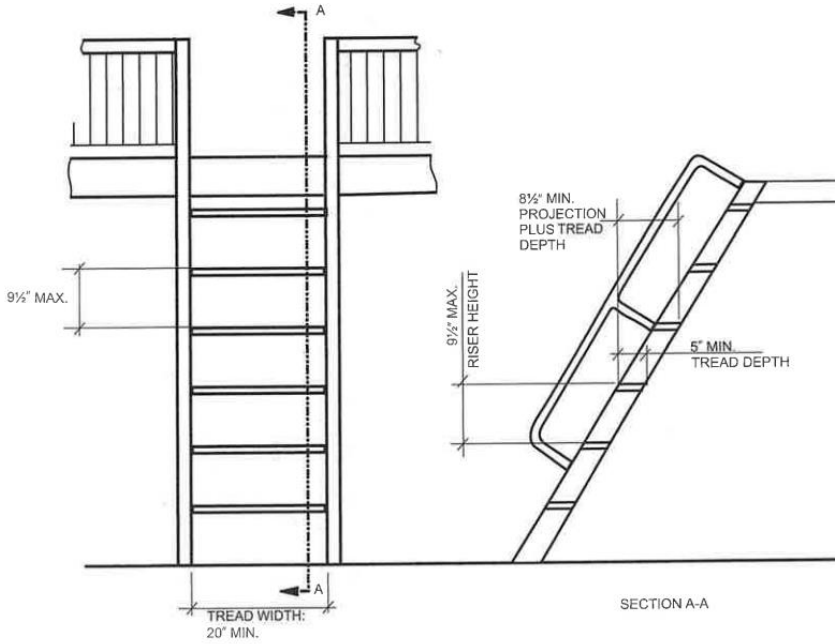
Alternating tread Devices - R311.7.11



- Now permitted as a means of egress for lofts, mezzanines and similar areas < 200 sq. ft., gross
- Are not allowed to be the sole means of access to a kitchen or bathroom

Building Planning

Ship's ladders - R311.7.12

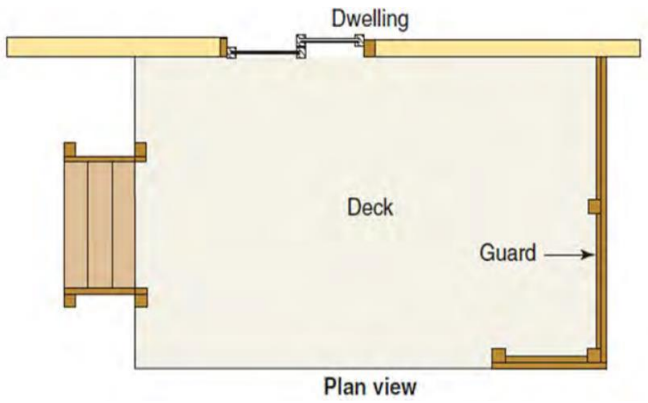


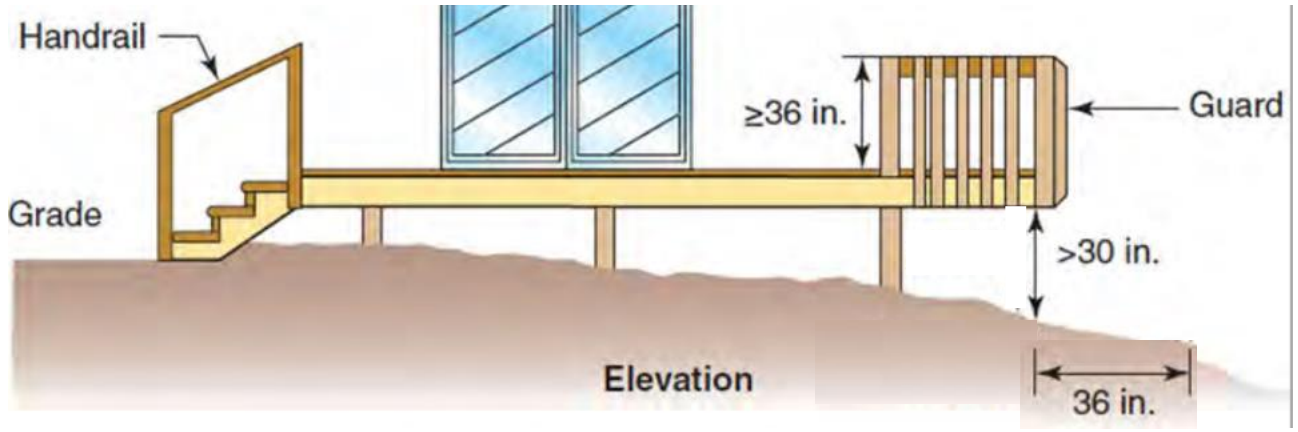
- Now permitted as a means of egress for lofts, mezzanines and similar areas < 200 sq. ft., gross
- Are not allowed to be the sole means of access to a kitchen or bathroom

Building Planning

(Guards) Where required – R312.1.1

- Guards are *only required for portions* of a walking surface that are ≥ 30” above grade at any point within 36” horizontally to the edge of the open side





Building Planning

Roof access and pathways for Photovoltaic Solar Systems – R324.6

- Added requirements for roof access, pathways and setbacks for emergency egress and firefighting operations. A roof layout plan showing the required access, pathways and setbacks shall be submitted with the electrical permit.

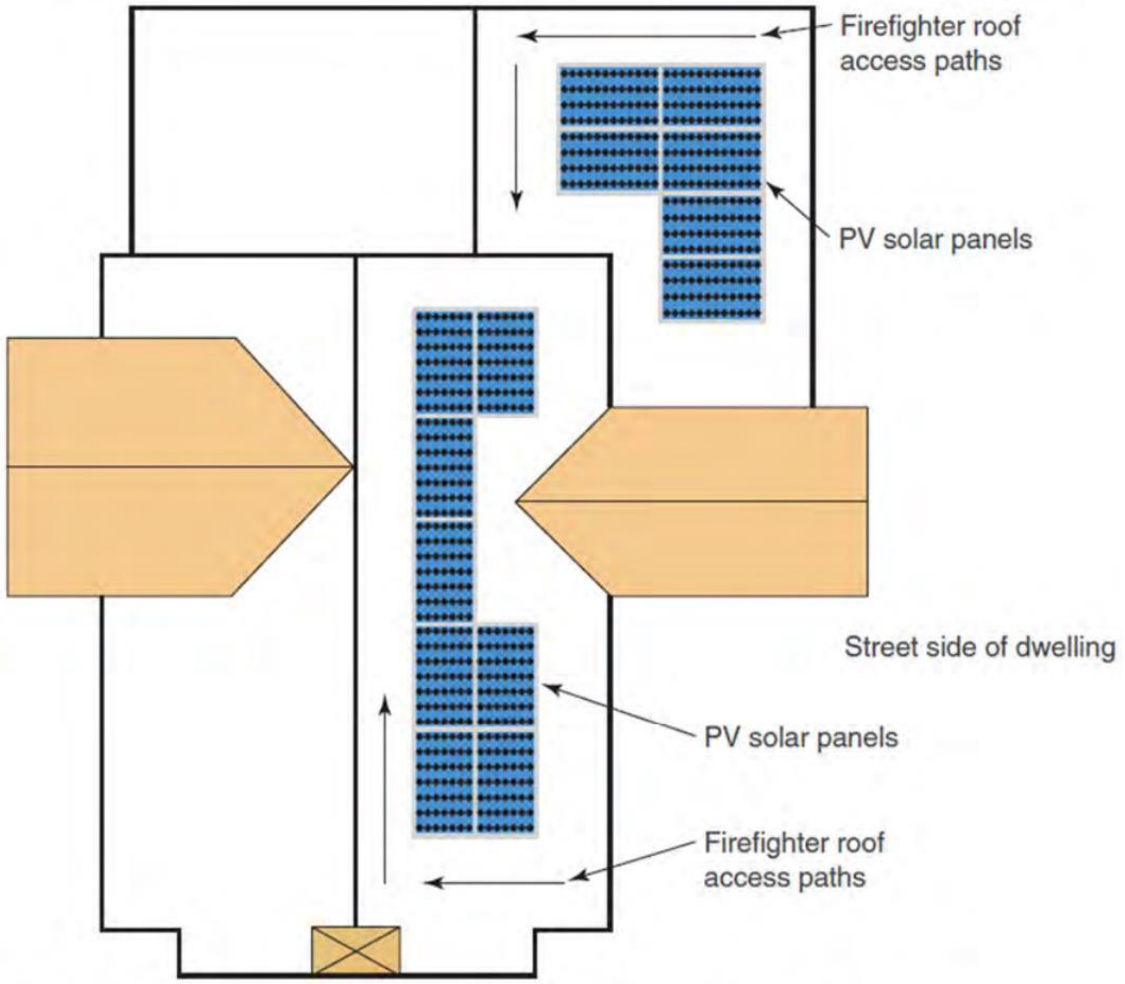
- Minimum number and width of pathways are as follows:
  - Pathways must be at least 36-inches wide
  - Two per building on separate parts of the roof
  - One on the street or driveway side of the dwelling
  - One on each roof plane or adjacent roof plane with photovoltaic solar array

- Minimum setback widths on both sides of the ridge shall be:
  - 18-inches for arrays covering up to 33% of the roof area
  - 36-inches for arrays covering more than 33% of the roof area

Chapter 3

Building Planning

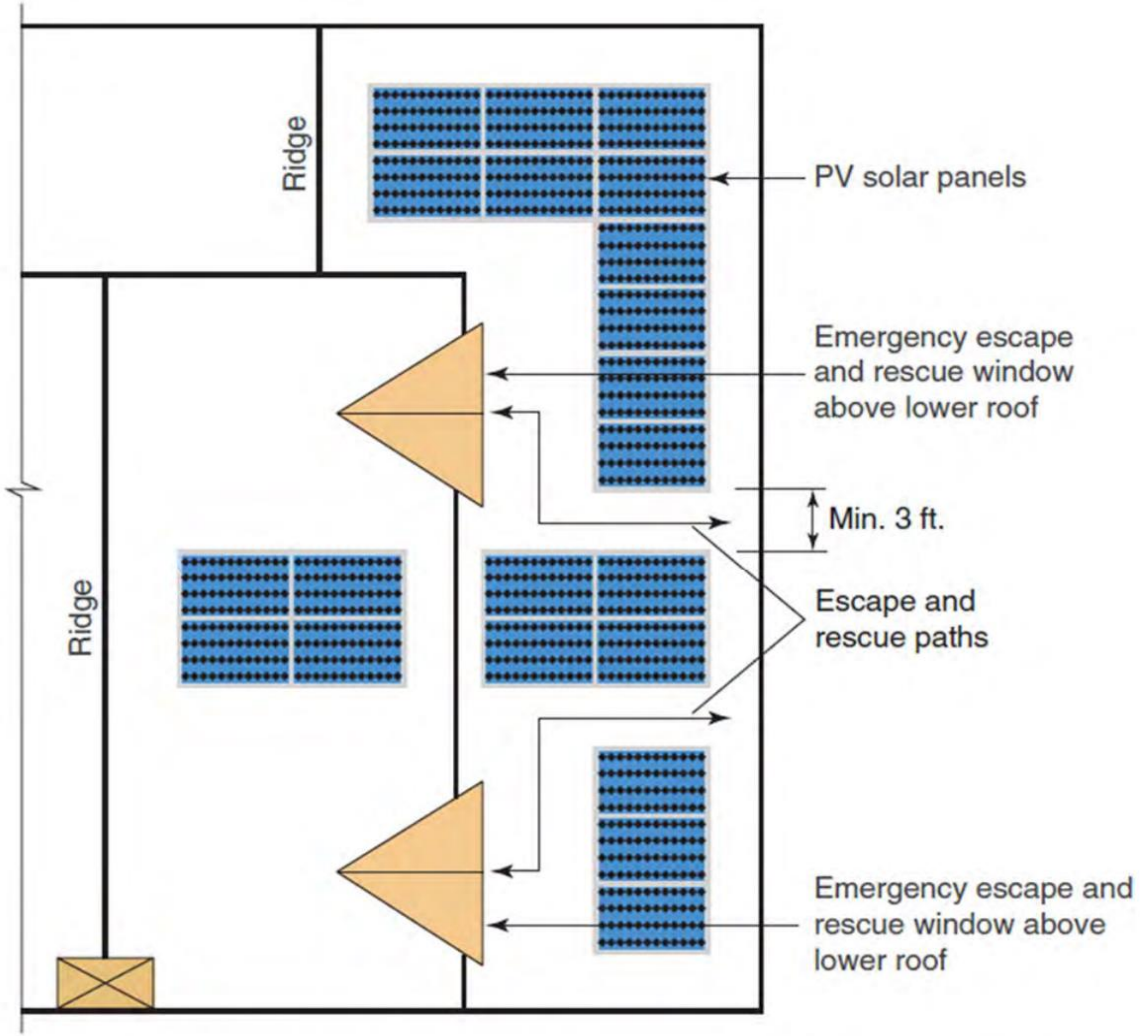
Roof access and pathways – R324.6 (for Photovoltaic Solar Systems)



Building Planning

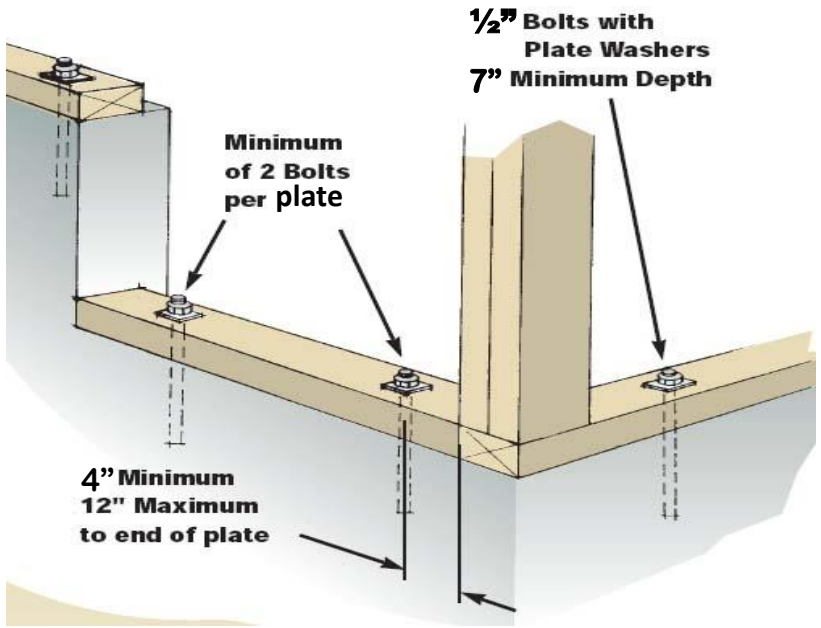
Emergency Escape and Rescue – R324.6.2.2 (for Photovoltaic Solar Systems)

- Solar panels cannot be installed directly below an emergency escape and rescue openings (EERO)
- A 36” minimum pathway for EERO’s is required above roof-mounted solar panels



Foundations

Foundation Anchorage – R403.1.6



- The centerline of anchor bolts shall be located 1 ¾" from the edge of the sill plate for plates > 2x4
- For 2x4 sill plates the centerline of the anchor bolts can be located 2" from the outside edge of the sill plate (e.g. for turn-down slabs) or use an approved strap
- Anchor bolts to be located no more than 12" and not less than 4" from the end of each sill plate

Foundations

Table R403.4 – Minimum Depth and Width of Crushed Stone Footings

- Table is only for precast concrete walls
- Table now includes the **width** of crushed footings
- Only for linear loads; designer must specify stone pad for point loads
- Eliminated 6” wide foundation walls

Foundations

Unvented Crawl Space – R408.3

- Added option of a dehumidifier for an unvented under-floor space
- Dehumidifier must provide 70 pints of moisture removal per day for every 1,000 sq. ft of crawl space floor area

Floors – Exterior Decks

Footings – R507.3

- Decks must be supported on concrete footings or approved structural system (e.g. solid CMU block)
- 12” min. footing embedment depth on undisturbed ground surface permitted for *free-standing decks* only (R403.1.4 & R403.1.4.1)
- Footings are not required for free-standing decks if joists are directly supported on grade for their entire length

Chapter 5

Floors – Exterior Decks

Minimum Deck Footing depth – R507.3.2

1. Free-standing decks that meet all of the following criteria:
   a) joists bear directly on precast concrete pier blocks at grade without support by beams or posts
   b) the area of the deck does not exceed 200 square feet
   c) the walking surface is not more than 20” above grade at any point within 36” measured horizontally from the edge

2. Free-standing decks do not require footings to extend below the frost line

Chapter 5

Floors – Exterior Decks

Flashing – R507.2.4

- Flashing must be corrosion-resistant metal (.019 inch nominal thickness) or an approved non-metallic material that is compatible with the building substrate and decking
- **Aluminum** flashing is PROHIBITED for contact with treated wood
- Plans submitted for construction of a deck that is attached to a house with a ledger shall include a detail depicting the flashing method and material

Chapter 5

Floors – Exterior Decks

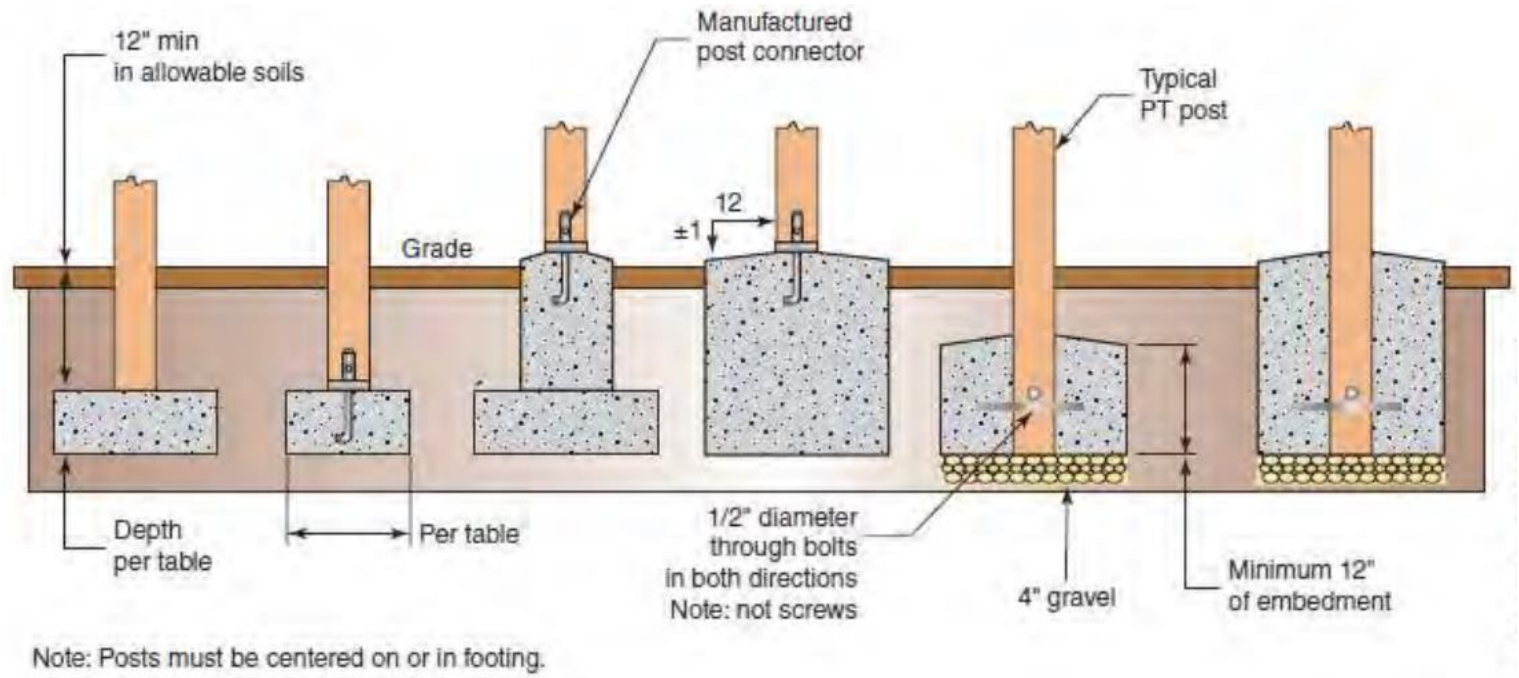
Minimum Footing size – R507.3.1

- Minimum concrete footing size based on tributary area and allowable soil bearing pressure
- Table R507.3.1 provides for square and round deck footing sizes for allowable soil bearing pressures of 1500 psf to ≥ 3000 psf
- For table R507.3.1 go to: https://codes.iccsafe.org/content/VRC2018P2/chapter-5-floors#VRC2018P2_Ch05_SecR507.3.1
- Allowable soil bearing pressures obtained from soils report or from table R401.4.1 based on material class

Chapter 5

Floors – Exterior Decks

Deck Footings



Deck Post to deck footing connection Figure R507.3

Chapter 5

Floors – Exterior Decks

Deck post to deck footing connection – R507.4.1

- Previously post embedment of 12” min. in surrounding soils/concrete for lateral support was allowed for any soil

- *New exception*; If expansive, compressible, shifting or other questionable soils are present the surrounding soil shall not be relied on for lateral support

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Chapter 5

Floors – Exterior Decks

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Deck Posts – Table R507.4

Single ply beams now added to Table R507.5

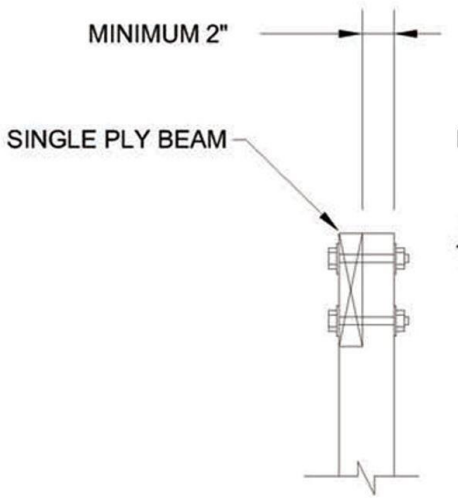
- Expanded table to include 8x8 post; post can be notched to support up to 3-ply beam; the remaining post must be a 2 ½" minimum after notching
- Limited maximum height of a 3-ply beam on a 4x4 post with a post cap to 6'-9" max.
- The maximum height for a notched 4x4 post supporting a 1-ply beam or a 4x4 post with post cap supporting a 2-ply beam is 8'-0"
- Beam splices must occur over post
- 5 ½" min. bearing must be provided for beam splices over post

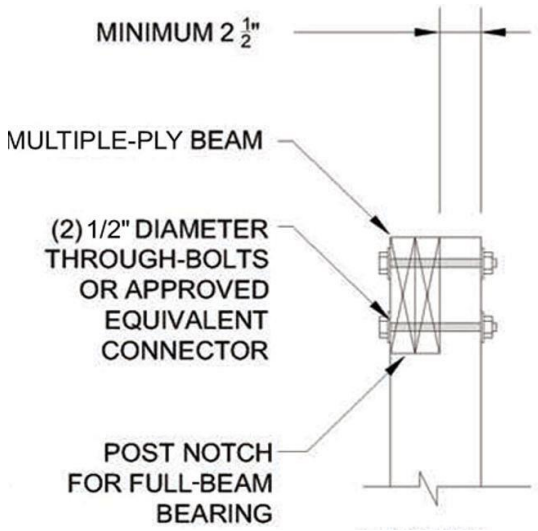
Chapter 5

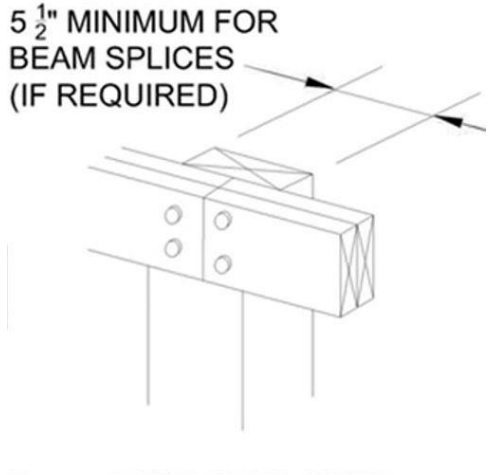
Floors – Exterior Decks

Note: LedgerLoks and other structural screws are PROHIBITED for beam to post connection

Deck Posts – Details







Notched 4x4 with 1-ply beam

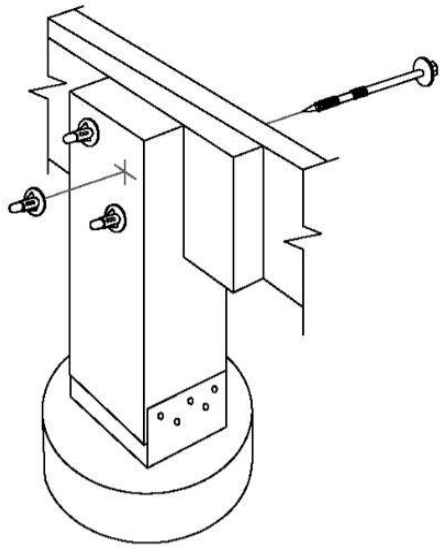
Notched 6x6 with 2-ply beam

Min. bearing at post for beam splice

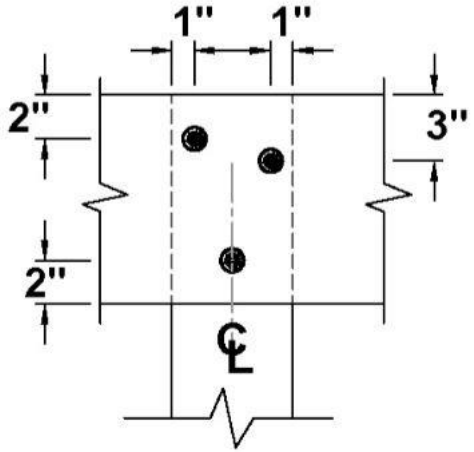
Floors – Exterior Decks

Beam to Deck Posts connection - Alternative

- In lieu of the required 2- ½” dia. thru bolts, 3 – 7” ThruLOK fasteners with 2-2x8 beam (min.) can be used



Isometric View



Front View

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Chapter 5

Floors – Exterior Decks

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Deck Joist – R507.6, R507.6.2 & Table R507.6

- Maximum joist span lengths and *maximum* cantilever lengths now listed in table
- Maximum cantilever limited to ¼ of the joist span, or the maximum cantilever length listed in table, whichever is less
- Joist ends must be laterally restrained by joist hangers or provide blocking between joist at the support; blocking/hanger depth must be at least 60% of the joist depth
- Maximum joist span lengths clarified for free-standing decks or decks attached to house

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Chapter 5

Floors – Exterior Decks

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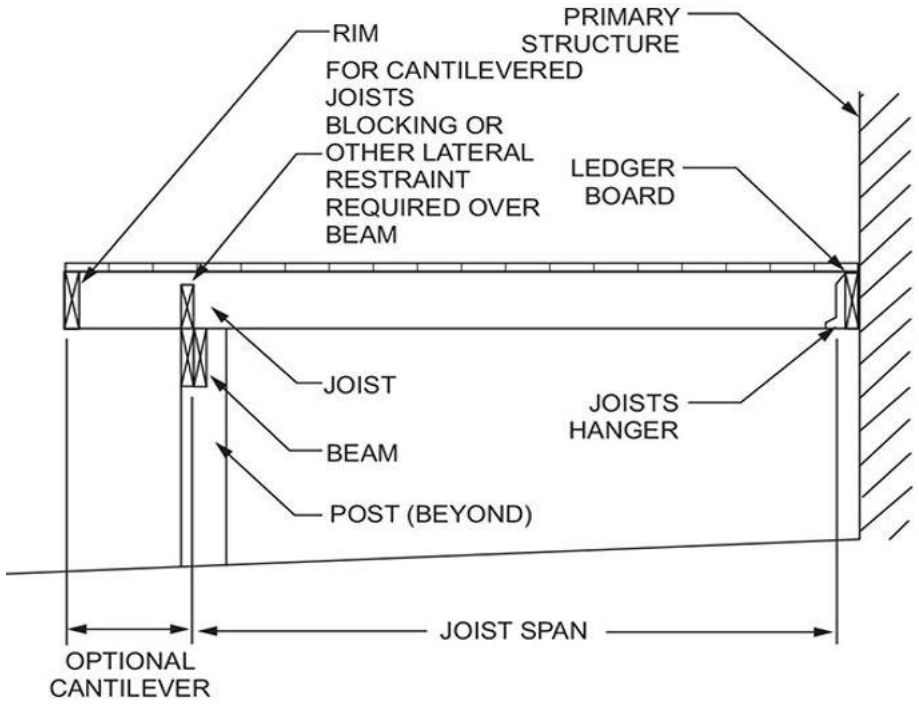
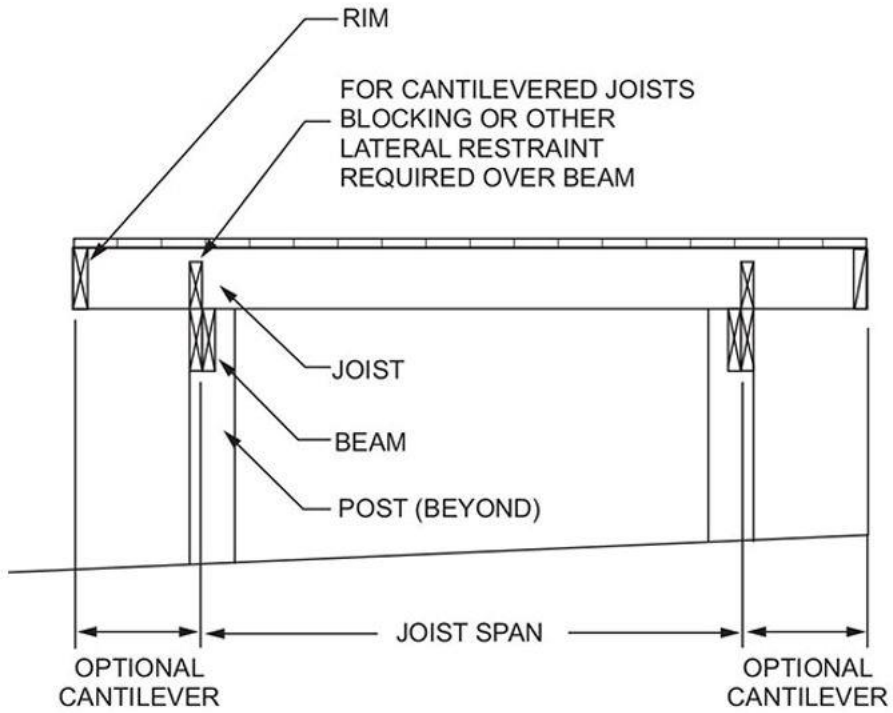


CANTILEVERED JOISTS WITH DROPPED BEAM



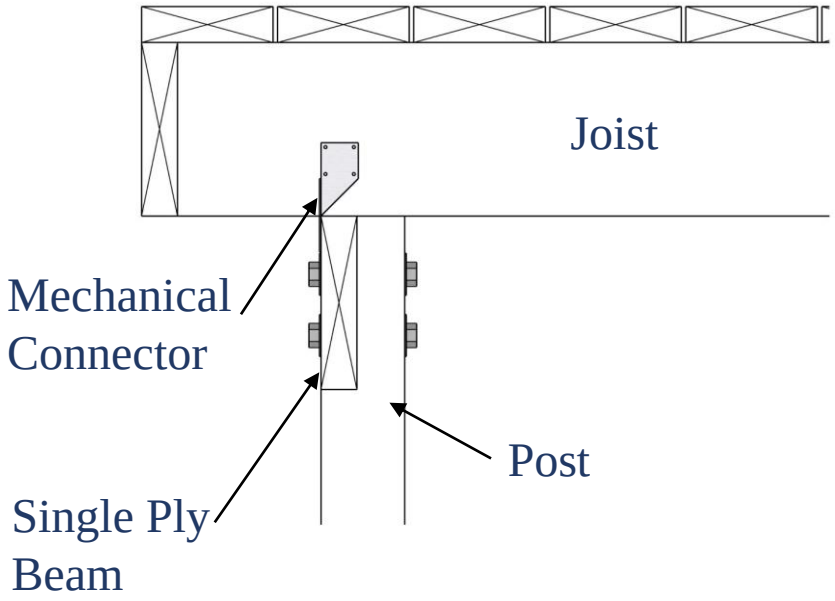
JOISTS ON FREE-STANDING DECK WITH DROPPED BEAM

- Joist span is measured from centerline of joist hanger to centerline of beam (or centerline of joist hanger to centerline of joist hanger for flush beam)

Chapter 5

Floors – Exterior Decks

Deck Joist Bearing – R507.6.1



- A mechanical connector must be provided for joists bearing on top of a single-ply beam or ledger board
- An approved joist hanger must be provided for joists framing into the side of a beam or ledger board

Chapter 6

Wall Construction

Alternate Stud Height - Table R602.3(6)

- Table allows for 11 ft and 12 ft tall exterior load-bearing studs for one- and two-story dwellings
- Limited to a maximum roof/floor span of 24 ft
- Cannot contain a habitable attic
- Refer to footnote “a” below table for attachment requirements

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Chapter 6

Wall Construction

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Lateral Support for headers - Table R602.7.5

MAXIMUM HEADER SPAN (feet)	ULTIMATE DESIGN WIND SPEED AND EXPOSURE CATEGORY	
	< 140 mph, Exposure B or < 130 mph, Exposure C	≤ 115 mph, Exposure B[b]
4	1	1
6	2	1
8	2	1
10	3	2
12	3	2
14	3	2
16	4	2
18	4	2

Chapter 6

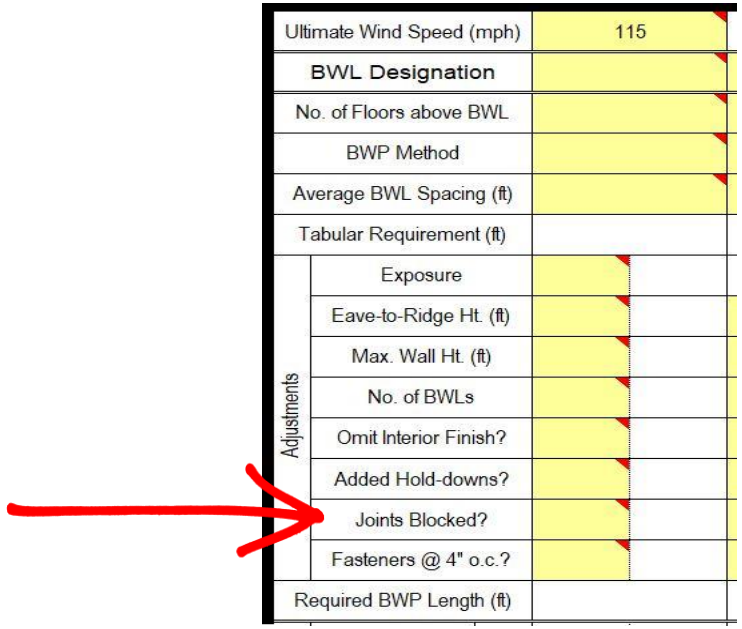
Wall Construction

Lateral Support for headers - Table R602.7.5

- Requires 1 king stud for header spans ≤ 8 feet
- Requires 2 king studs for header spans > 8 feet and up to 18 feet (max.)
- For ultimate wind speed of ≤ 115 mph and Exposure Category B
- Provides for the number of king studs required at each end of a header in exterior walls when jack studs are provided to support the header at each end
- If a framing anchor is used to support the header on the king stud, then the number of king studs shall comply to the requirements for wind speed of < 140 mph, Exposure B

Wall Construction

Adjustment Factors for Wall Bracing – Table R602.10.3(2)



Ultimate Wind Speed (mph)		115
BWL Designation		
No. of Floors above BWL		
BWP Method		
Average BWL Spacing (ft)		
Tabular Requirement (ft)		
Adjustments	Exposure	
	Eave-to-Ridge Ht. (ft)	
	Max. Wall Ht. (ft)	
	No. of BWLs	
	Omit Interior Finish?	
	Added Hold-downs?	
	Joints Blocked?	
	Fasteners @ 4" o.c.?	
Required BWP Length (ft)		

- Added a horizontal blocking adjustment factor of 2.0 for bracing methods WSP and CS-WSP if the horizontal blocking is omitted
- So, if you choose to omit the horizontal blocking the amount of bracing must be increased
- Noted as “Joints Blocked?” in the calculation spread sheet
- Applies to any story

Wall Construction

Mixing Wall Bracing Methods – R602.10.4.1 #4

- Mixing of intermittent bracing methods with continuous bracing methods along a braced wall line is still permitted
- Now clarifies that the more restrictive intermittent bracing type must be used when determining the minimum amount of bracing when mixing methods

Chapter 7

Wall Covering

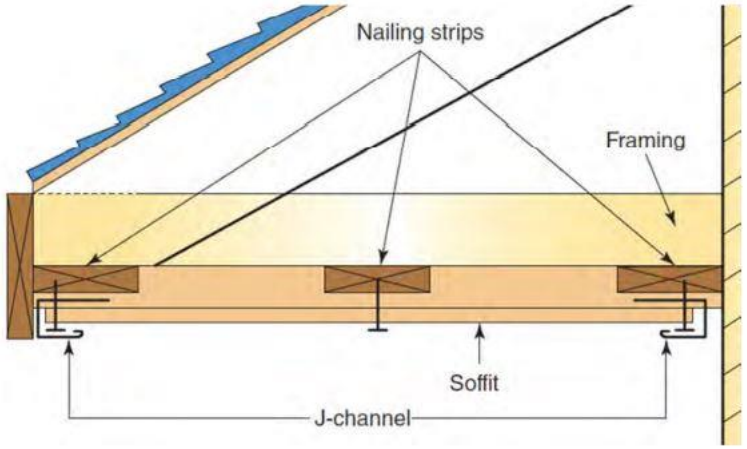
Water-resistive Barrier – R703.2

- Now required for detached accessory structures (previously exempt)
- Water-resistive barrier/house wrap/other materials to be installed according to the Manufacturer's installation instructions

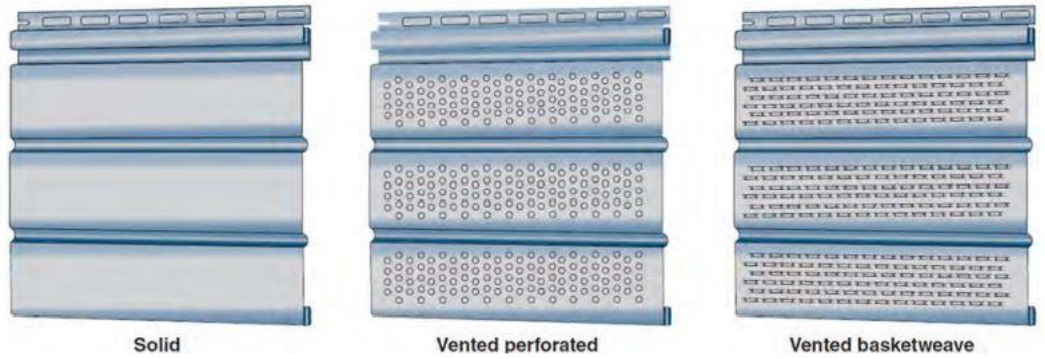
Chapter 7

Wall Covering

Soffit Installation – R703.3.1



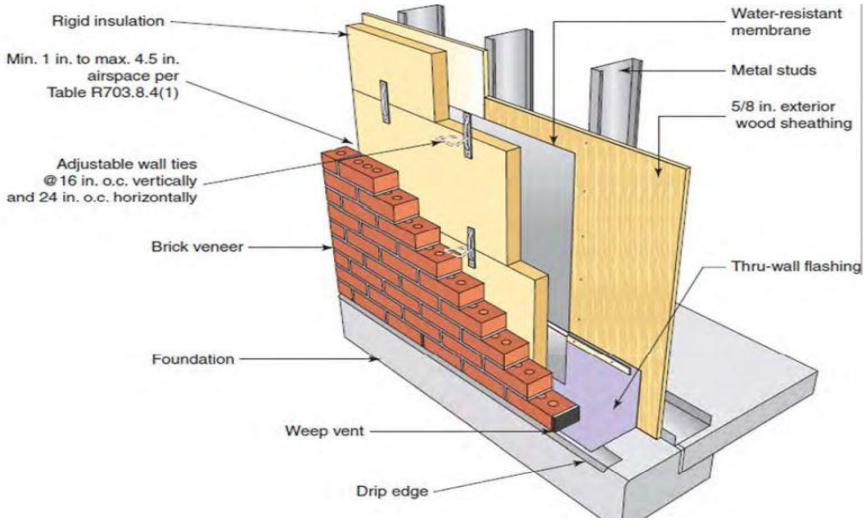
- Added wood structural panel soffits and clarified vinyl soffit requirements
- Lists minimum material thickness, nail size and fastening requirements
- Maximum unsupported span for vinyl soffit panels is 16”, or as specified by manufacturer’s installation instructions



Chapter 7

Wall Covering

Masonry Veneer Anchorage – R703.8.4



- Provides an alternative attachment of wall ties directly fastened to the wall sheathing
- Requires more ties to be installed per Table R703.8.4(1)
- Limits the maximum wall height to 30 ft
- Allows wall ties to be attached through 2” thick (max.) insulated sheathing into underlying wall sheathing (WSP)
- WSP must be 7/16” thick, minimum
- Accommodates energy efficient framing techniques which can make it difficult to located studs behind panels

Chapter 8

Roof-Ceiling Construction

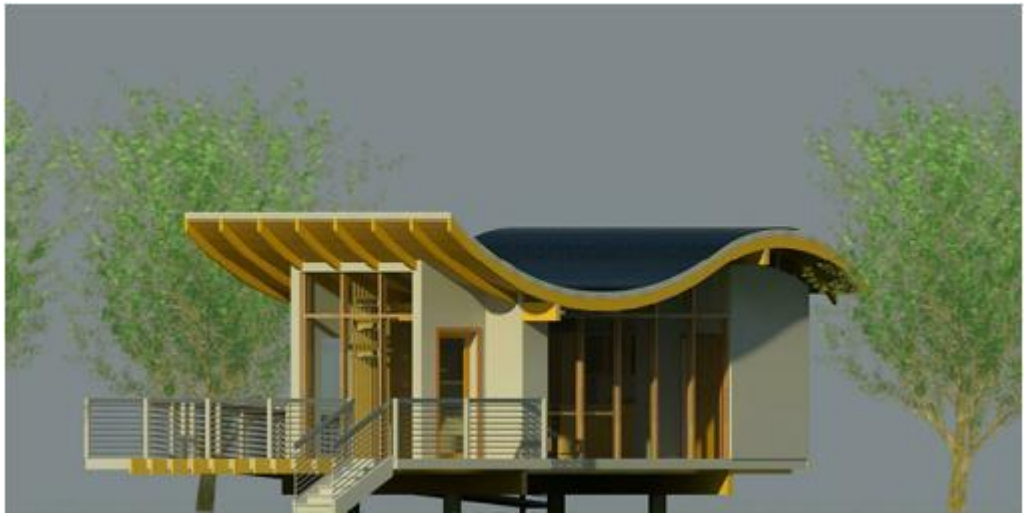
Wood Roof Framing – R802

- This section was reorganized for clarification
- Organized section into 3 separate components: Roof ridge, Rafters and Ceiling joist
- Subsections further divided into ridge, rafter, purlin, collar tie and ceiling joist
- Added requirement for low-slope rafters

Roof-Ceiling Construction

WSP Sheathing Installation – R803.2.3

- WSP roof sheathing in accordance with Table R503.2.1.1(1) shall not cantilever more than 9 inches beyond gable end wall without support of overhang

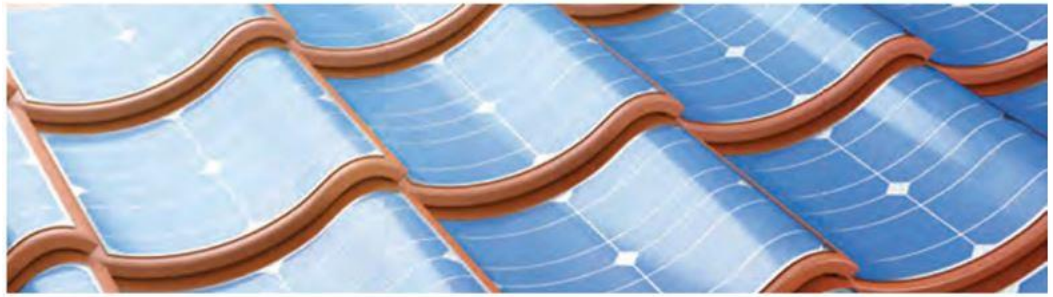


Chapter 9

Roof Assemblies

Roof Underlayment Requirements – Table R905.1.1(1) & R905.1.1(2)

- Underlayment for photovoltaic (PV) shingles added to the tables for consistency
- Photovoltaic shingles are rarely seen in Residential construction



Chapter 9

Roof Assemblies

Building-Integrated PV roof Panels (BIPV) – R905.17

- Addresses installation and attachment of building-integrated photovoltaic roof panels (BIPV)
- Photovoltaic panels function as a component of the building envelope

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Chapter11

Energy Efficiency

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Certificate – N1101.14

- Now mandatory to provide a permanent certificate indicating the predominant R-values of insulation in or on:
  - Ceilings, roofs, walls or foundation components, such as slabs, basement walls, crawl space walls, floors and ducts
  - U-factors of fenestration and the solar heat gain coefficient
  - Results from duct system and building envelope air leakage testing
  - Types and efficiencies of heating, cooling and service water heating equipment other than gas fired unvented room heaters, electric furnaces and baseboard electric heaters

Energy Efficiency

Certificate – N1101.14 continued

- Certificate to be posted on a wall in the space where the furnace is located, a utility room, or an approved location inside the building
- Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label, or other required labels

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Energy Efficiency

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Sample Certificate

Energy Efficiency Certificate					
Insulation Rating			**R-Value**		**R-Value**
Ceiling/Roof			R-		R-
Walls		Frame	R-	Mass	R-
Basement			R-	Crawl Space	R-
Floors	Over unconditioned space		R-	Slab edge	R-
Ducts		Attic	R-	Other	R-
Air Leakage Test Results					
Duct Testing		Cfm/100sqft	(Mandatory for both Commercial and Residential)		
Blower Door		ACH/50Pa.(for Residential) or			
		Visual Inspection in accordance w/Table 402.4.2 of the 2009 IECC			
Fenestration Rating	**NFRC U-Factor**			**NFRC SHGC**	
Window	U-				
Opaque door	U-				
Skylight	U-				
Equipment Performance	**Type**			**Efficiency**	
Heating system					AFUE
Cooling system					SEER
Water heater					EF
Indicate if the following have been installed (an efficiency shall not be listed)					
Electric Furnace	Gas-fire unvented room heater			Baseboard electric heater	
Designer/builder					
Code edition			Date		

Chapter 11

Energy Efficiency

Insulation & Fenestration Requirements by Component – Table N1102.1.2

- Fenestration U-Factor = 0.32 (max)
- Ceiling Insulation R-value increased to R-49 (min)

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Chapter 11

Energy Efficiency

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Ceilings with Attic spaces – N1102.2.1

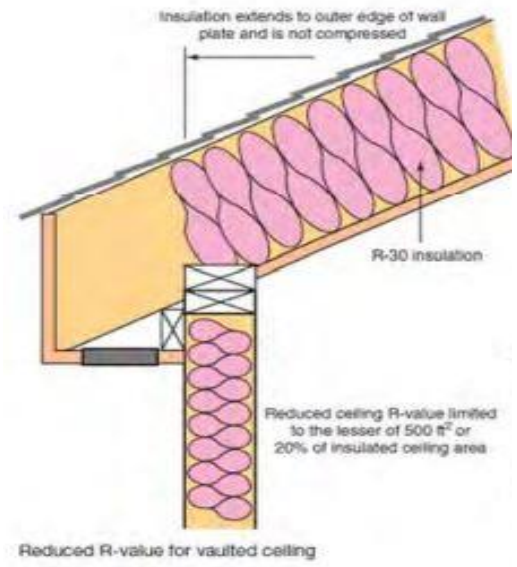
R-value Rating	Open-cell spray foam thickness	Closed-cell spray foam thickness
R-13	3.6 inches	2.1 inches
R-19	5.2 inches	3.1 inches
R-21	5.8 inches	3.5 inches
R-30	8.3 inches	5.0 inches
R-38	10.5 inches	6.3 inches
R-49	13.6 inches	8.1 inches
R-60	16.6 inches	10.0 inches

- Where R-49 is required to be installed in the ceilings, R-38 can be used if installed over 100% of the ceiling area required to be insulated
- R-38 Insulation must extend ***"uncompressed"*** over the outer edge of the top plate at the eaves
- For R-49, which is 14" thick, a minimum cavity depth of 14" must be provided plus 1" airspace
- For R-38, which is 12" thick, a minimum cavity depth of 11 7/8" must be provided plus 1" airspace

Chapter 11

Energy Efficiency

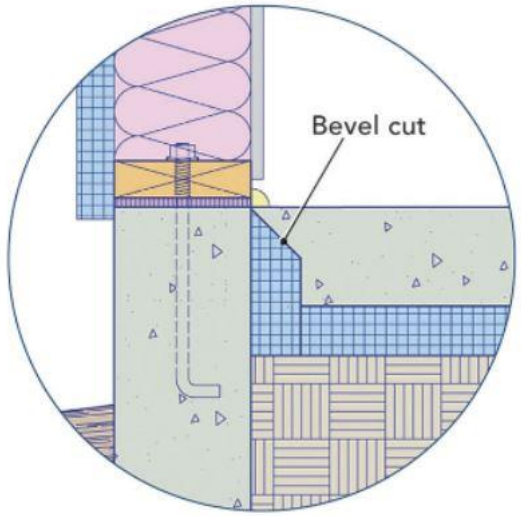
Ceilings without Attic spaces – N1102.2.2



- Applies to vaulted, cathedral or flat ceilings
- Where the roof /ceiling assembly does not allow sufficient space for the installation of insulation greater than R-30 the minimum insulation shall be R-30 *provided* that the insulation extends ***"uncompressed"*** to the outer edge of the wall plate
- Minimum cavity depth for uncompressed R-30 is 11 ¼" plus 1" airspace which requires 2x12 nominal lumber or trusses to be built out/ furred down
- Limited to 500 square feet or 20% of the total insulated ceiling area, whichever is less

Energy Efficiency

Slab-on-grade (SOG) Floors – N1102.2.10



- Slab insulation is required for SOG floors
- Insulation required for SOG floor surface less than 12 inches below grade
- Insulation to extend down from top of slab on outside or inside of foundation wall for a total of 2 feet
- ResCheck no longer allows trade-off if SOG insulation is omitted

Chapter 11

Energy Efficiency

Testing – N1102.4.1.2

- Blower door testing now required
- Testing must be performed by a Virginia licensed general contractor, a Virginia licensed HVAC contractor, a Virginia licensed home inspector, a Virginia registered design professional, a certified BPI Envelope Professional, a certified HERS rater, or a certified duct and envelope tightness rater
- Results must be signed and provided to the Building Inspections department
- Testing shall be performed at any time after creation of all penetrations of the building thermal envelope

Energy Efficiency

Duct Testing – N1103.3.3

- Duct air leakage testing now is mandatory
- Ducts shall be pressure tested 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. across the system, including the manufacturer's air handler enclosure if installed at the time of the test. All registers shall be taped or otherwise sealed during testing.

Duct Testing – N1103.3.3 continued

2. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1-inch w.g. across the entire system, including the manufacturer's air handler enclosure. Registers shall be taped or otherwise sealed during the test.

Exception: A duct air leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. The licensed mechanical contractor installing the mechanical system shall be permitted to perform the duct testing. The contractor shall have been trained on the equipment used to perform the test.

Chapter 11

Energy Efficiency

Ducts buried within ceiling insulation – N1103.3.6

- New section provides requirements for ducts buried within ceiling insulation
- The duct insulation shall be R-8 min.. Ducts shall be encapsulated both above and below the duct by insulation with an R value of at least R-19
- Specifies thermal benefits and coverage requirements for such ductwork
- See Section N1103.3.6.1 for deeply buried ducts
- For more information refer to the mechanical code change presentation

Chapter 11

Energy Efficiency

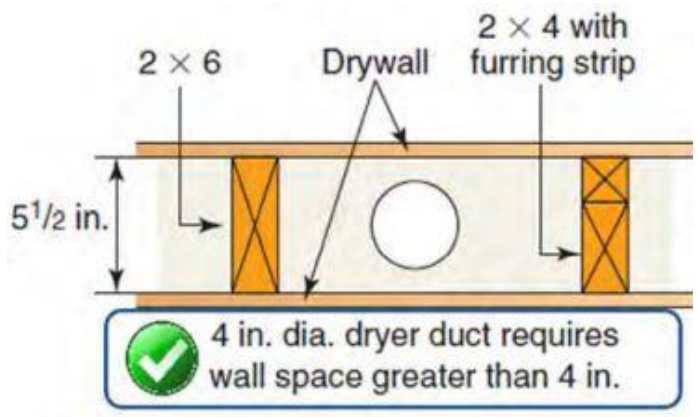
Lighting equipment – N1104.1

- Now mandatory that at least 90% of permanently installed lighting fixtures (e.g., light bulbs) are high-efficacy e.g., LED lights
- LED lights are increasingly available and have competitive costs

Chapter 15

Exhaust Systems

Duct Installation – M1502.4.2



- Where dryer exhaust ducts are enclosed in wall and ceiling cavities, such cavities shall allow the installation of the duct without deformation
- To accommodate 4-inch dryer exhaust ducts without deformation, the wall space must be larger than a 2x4 stud cavity
- Intent is to prevent an obstructed air flow, stress on duct joints, seams and fittings and aid in duct cleaning

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- For Mechanical, Electrical and Plumbing Code changes go to: https://henrico.us/bldg