

Introduction to Plan Review for Permit Technicians



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Instructor: Bill Clayton, CBO, CHCO, CBCO



- Over 33 years of Code Administration and enforcement experience
- Instructor, Consultant, Inspector, Plans Examiner, RCBO
- ICC/IBC General Committee 2015 cycle
- ICC/IEBC Committee 2009 & 2012 cycle
- Instructor with CCC & Shums Coda 11+ years
- Contract 3rd party Instructor for ICC 8+ years
- CO-Author of 2024 ICC resource book "Fire Stopping, Joint Systems, and Dampers"



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Who are all of you?



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Interactive Class

- Don't be afraid to ask questions.
- There are no dumb questions



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Class Summary

- Code Requirements
- Tools needed to get started
- Submittal Requirements
- What documents should be provided at submittal
- Plan reading
- Basic IRC Plan Review Skills
- Plan review/customer skills
- Basic Legal Aspects of plan review
- Necessary inspections for different IRC projects
- Example reviews of Basement finish, Deck, and detached garage.



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What is the purpose of the code?

Establish minimum requirements to provide a reasonable level of safety, health and general welfare through affordability, structural strength, means of egress, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards and to provide a reasonable level of safety to fire fighters and emergency responders during emergency operations.

- Codes accomplish this through:
- MOE requirements
- Energy codes
- Proper construction to minimize health risks
- Proper construction to minimize fire risk
- It is not intended to assure quality craftsmanship or enforce contracts—that is up to the owner.



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What does the IRC regulate?

- One & Two-Family dwellings
- Townhouses
- “Construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one & two-family dwellings and townhouses not more than 3 stories above grade plane in height with separate means of egress and their accessory structures.”
- Sheds,
- Detached garages,
- Decks
- Patio covers
- Fences
- Basement finishes
- Room additions
- Alterations (remodels)
- Certain projects as listed in the exceptions



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What this Class Will Not Cover

- New construction of One & Two-family, or Townhouses
- IBC Projects
- Local amendments
- Not an IRC introductory course but will identify tools to help you find items in the code.



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Counter skills

- Permit techs are the first point of contact for most customers
—you are the face of the organization
- Professional Manner
- Courteous
- Prompt
- Good frame of Mind
- Refrain from Criticism
- Work to limit complaints
- How would you want to be treated?



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Develop a reputation

- TOUGH
- KNOWLEDGABLE
- FAIR
- REASONABLE
- UNDERSTANDS CONSTRUCTION
- A JERK
- DOESN'T KNOW THE CODE—MAKES CRAP UP
- HARD TO WORK WITH
- UNREASONABLE
- ARROGANT *#!^!



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Be kind as not everyone is a trained architect or code professional



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Public Relations

- Occasionally you will be dealing with inexperienced persons
- Be Patient
- Expect to spend more time
- Use this and every opportunity to educate about the code
- Give explanation if asked...Not because the code says but why—what is the intent and reason

intent | in-tent | noun n.v. | [See synonyms for intent](#) / [intent](#) / [intentions](#) on [Thesaurus.com](#) Elementary Level

noun

- 1 something that is intended, purpose, design, intention
- 2 the original mind of the contractor when he made funds
- 3 the act or fact of intending, as to do something: criminal intent
- 4 Law: the state of a person's mind that directs his or her actions toward a specific object: meaning or significance

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Public Relations

- What tools are available to you to learn the intent?
- Why is the intent important?
- How are codes developed?
- What are your local amendments and interpretations?
- What are local policies? Is everyone in your department on the same page?
- Do you understand local laws regarding permits and licensing?



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IRC Required Submittal Documents R106



- Submittal documents consisting of construction documents, statement of special inspections, geotechnical report and other data shall be submitted in two or more sets or in a digital format with each permit application.



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Submittal Documents R106



- The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.



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Submittal Documents R106



- Where special conditions exist, the building official is authorized to require additional construction documents to be prepared by a registered design professional.



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Submittal Documents 107.1

- Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.



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What tools do you need to do your plan review?

- Adequate counter space or plan table
- Calculator
- Straight edge
- Architect and engineer's scale
- Code books and local amendments
- Quiet area so you can concentrate?
- Hi-lighters, markers, red pens
- Patience----lots of patience!



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Approval Of Construction Documents - R106.2

Reviewed for Compliance

- When the building official issues a permit, the construction documents shall be approved, in writing or by stamp, as "Reviewed for Code Compliance."




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Electronic Code Review?

- Does your jurisdiction allow/require electronic plans?
- What format?
- If hard copy only, how many copies and what size?




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Plan Review Resources

- ICC Publications and codes
- Standards
- Electronic codes (ICC library)
- Federal Requirements (max GPM flush for toilets, Max GPM shower flow)



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Tools/Equipment

- Code References

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Checklist?

- Various checklists are available...consider the source and be aware that typically none of them include your local amendments—
- Be careful and do not use “UPCODES”
- Code book as check list
- Software programs to help with plan review
- Ben Weese: Building Code Studies by Plan Analyst for the IRC

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Tools/ Equipment



- Highlighters
- Sticky notes
- Use to mark details to come back to

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Tools/Equipment Electronic review:

- Multiple (at least two) monitors (27" works great)
- Larger than normal
- Review software
- Bluebeam review (great tool)
- Electronic stamp and signature







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Tools/Equipment

- Scales
- Architects scale
- Engineer's scale
- TJI scale—set up based on normal Truss Joist spacing e.g. 16" OC, 19.2" OC

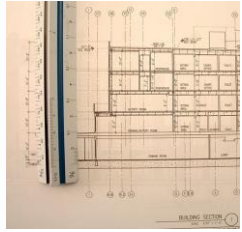





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SCALES

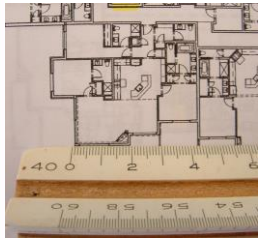
- Architectural – Fractions of an inch
- 1/4" = 1' - 0"
- 1/8" = 1' - 0"
- 1/16" = 1' - 0"

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SCALES



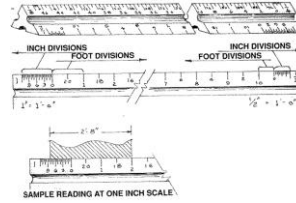
- Engineering – Decimal Fractions
- 1:20
- 1" = 20'
- 1:50
- 1" = 50'



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READING A SCALE



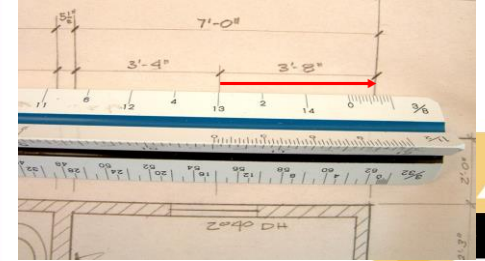
SAMPLE READING AT ONE INCH SCALE



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Reading an architect's scale



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Rolling Scale



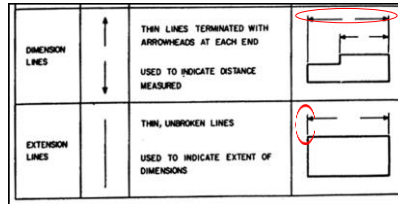
- Electronic
- Can be used for architectural, engineering or to take a running measurement



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Dimensions

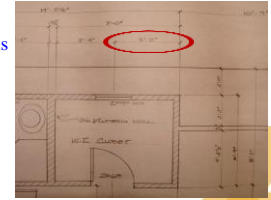


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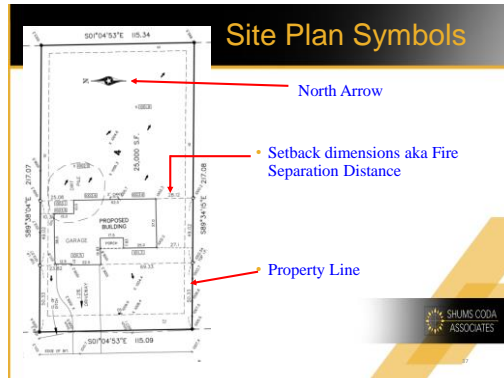
Dimensions

- Other dimension standards
- Slash End
- Line Weight

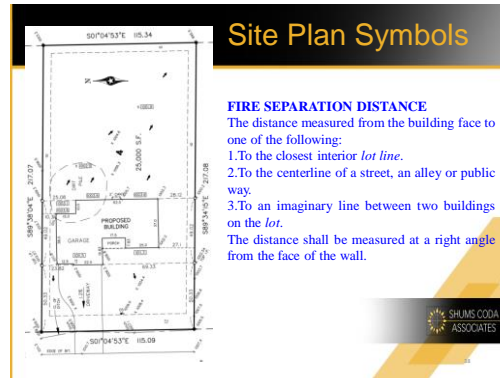


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2024 IRC

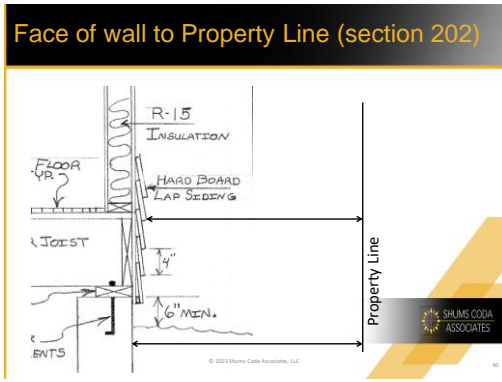
TABLE R302.1(1) EXTERIOR WALLS

EXTERIOR WALL ELEMENT	MINIMUM FIRE RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE	
Walls	Fire-resistance rated	1 hour—tested in accordance with 602.6.1.2.10, 602.6.1.2.11 or Section 602.6.1.2 of the International Building Code with equivalent test data.	0 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Not allowed	N/A	≥ 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant treated wood ¹	≥ 2 feet to < 5 feet
Coverages in walls	Not fire-resistance rated	0 hours	≥ 5 feet
	Not allowed	N/A	≥ 3 feet
Coverages in roofs	20% minimum of wall area	0 hours	≥ 3 feet
	Unlimited	0 hours	≥ 5 feet
Penetrations	All	Comply with Section 602.6.1.2	≥ 3 feet
		None required	≥ 3 feet

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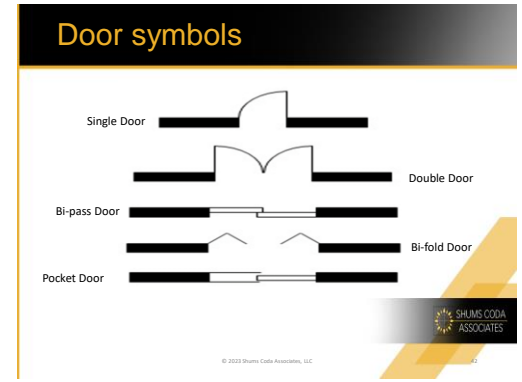
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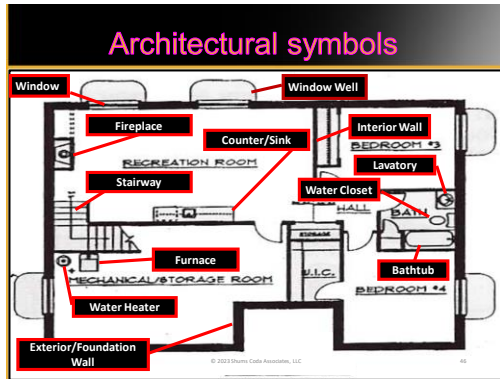
40

Material symbols

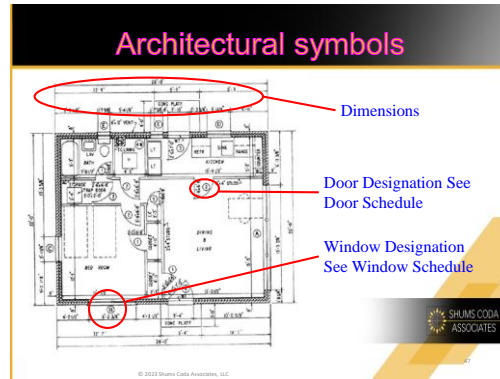
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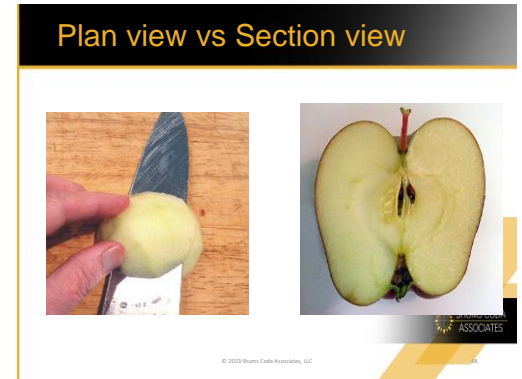
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46

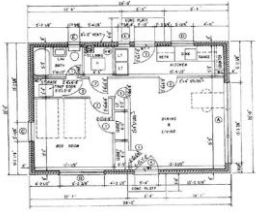


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Floor plan



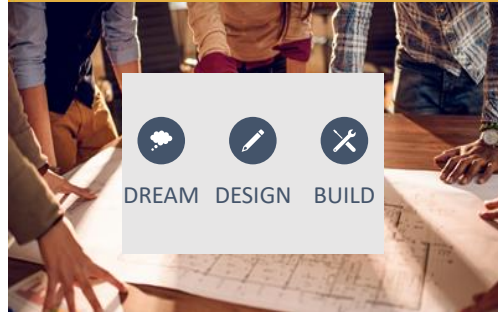
- Cut 4' above the floor birds-eye view
- Shows the lengths, thickness, and character of the outside wall and partitions at the floor level.
- It shows the number, dimensions, and arrangement of the rooms, the widths and locations of doors and windows and the locations and character of bathroom, kitchen, and other utility features.



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The Process

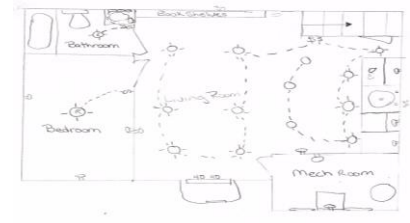


DREAM DESIGN BUILD

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Let's look at a typical basement finish plan

Are rooms labeled?

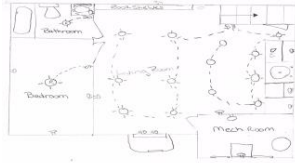


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Let's look at a typical basement finish plan

R313 Minimum height
 Habitable space, hallways and portions of basements containing these spaces shall have a ceiling height of not less than 7 feet. Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches



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



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Let's look at a typical basement finish plan

R313.1 Minimum height

Exceptions:

1. For rooms with sloped ceilings, the required floor area of the room shall have a ceiling height of not less than 5 feet and not less than 50 percent of the required floor area shall have a ceiling height of not less than 7 feet
2. The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a ceiling height of not less than 6 feet 8 inches above an area of not less than 30 inches by 30 inches at the showerhead.
3. Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches of the finished floor.
4. Beams and girders spaced apart not less than 36 inches in clear finished width shall project not more than 78 inches from the finished floor.

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Plumbing fixture layout

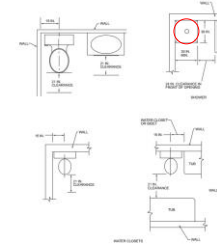


FIGURE R307.1 MINIMUM FIXTURE CLEARANCES

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Toilet space at least 30" wide and centered at < 15" from side wall or obstruction
 21" in front
 Shower not less than 30' x 30" and 900 Square inches at floor
 24" clearance in front of opening, min 24" opening and outswing



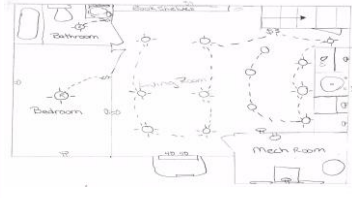
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Let's look at a typical basement finish plan

Means of Egress?

R318 & Egress window R319.7

Egress well R319.4



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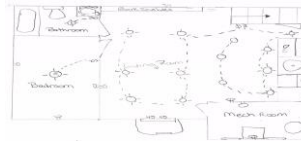
Let's look at a typical basement finish plan

R318.1 Means of egress

Dwellings shall be provided with a means of egress in accordance with this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage. The required egress door shall open directly into a public way or to a yard or court that opens to a public way

R318.4 Vertical egress.

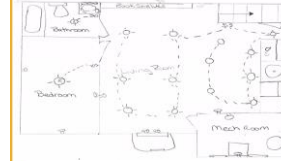
Egress from habitable levels including habitable attics and basements that are not provided with an egress door in accordance with Section R318.2 shall be by a ramp in accordance with Section R318.8 or a stairway in accordance with Section R318.7.



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R319.1 Emergency Escape/Rescue



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Basements, habitable attics, the room to which a sleeping loft is open, and every sleeping room shall have at least one operable emergency escape and rescue opening.

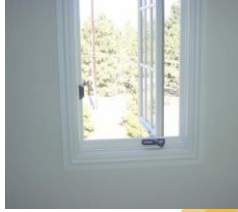
Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room.

4 Exceptions:

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Minimum opening area R310.2.1

5.7 square feet net clear opening
 5 square feet at grade floor (w/in 44")
 Min. 24 inches height
 Min. 20 inches width
 Must be obtained by the normal operation of the emergency escape and rescue opening from the inside.



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R310.2.3 Max. Opening Height

Emergency escape and rescue openings shall have the bottom of the clear opening not greater than 44 inches above the floor
 Where the sill height is below grade, it shall be provided with a window well in accordance with Sections R319.4.1 through R319.4.4.



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R310.2.3 Window wells

- Minimum horizontal area of the window (area) well be 9 square feet
- Minimum horizontal projection and width of 36 inches.
- Must allow the emergency escape and rescue opening to be fully opened.
- Exception: Ladders & steps can encroach 6".



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R319.4.2 Ladder and steps

Window wells with a vertical depth greater than 44 inches shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position.

Not required to comply with Sections R318.7

Ladders or rungs - inside width of at least 12 inches

Must project at least 3 inches from the wall

Must be spaced not more than 18 inches on center vertically for the full height of the window well.



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R319.4.3 Drainage

Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R405.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.4(2)



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R319.2.4 Emergency escape windows under decks and porches

Escape and rescue window must open fully, and the path is not less than 36 inches in height and width to a yard or court.

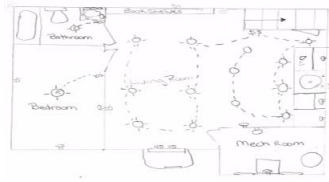


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Let's look at a typical basement finish plan

Smoke and Carbon Monoxide Detector? R310 & 311



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Location R310.3



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Smoke alarms required:

- Each sleeping room
- Outside of each separate sleeping area
- Each additional story including basements & habitable attics but not including crawl spaces and uninhabitable attics
- Within the room a sleeping loft is open to

R310.3 Smoke alarm location

Smoke alarms shall be installed not less than 3 feet horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section R314.3.

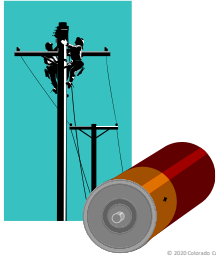


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Power Source R310.6



- New Construction
 - building wiring
 - battery backup
 - battery operated when commercial power not provided
- Alterations, repairs, additions not required to be hard wired & buildings w/o commercial power
 - battery operated permitted



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R311 Carbon monoxide alarms



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R311.2.1 New construction

For new construction, carbon monoxide alarms shall be provided in dwelling units where either of both of the following conditions exist.

1. The dwelling unit contains a fuel-fired appliance.
2. The dwelling unit has an attached garage with an opening that communicates with the dwelling unit.



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R311.2.2 Alterations, repairs and additions

Where alterations, repairs or additions requiring a permit occur, or where one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with carbon monoxide alarms located as required for new dwellings.

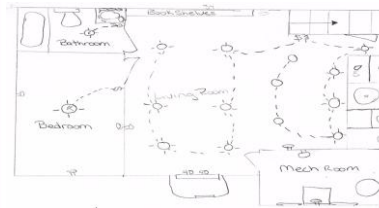


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R311.3 Location

Carbon monoxide alarms in dwelling units shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom



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Let's look at a typical basement finish plan

Storage under stairs? R302.7

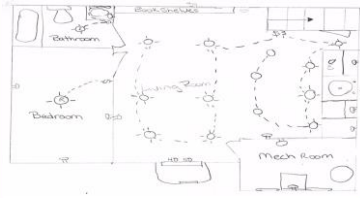


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R302.7 Under-stair protection

Enclosed space under stairs that is accessed by a door or access panel shall have walls, under-stair surface and any soffits protected on the enclosed side with 1/2-inch gypsum board

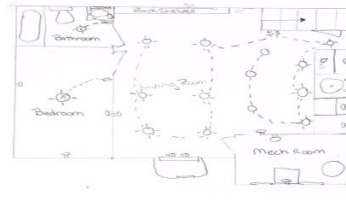


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Let's look at a typical basement finish plan

Complete electrical plan? Part VIII chapter 35

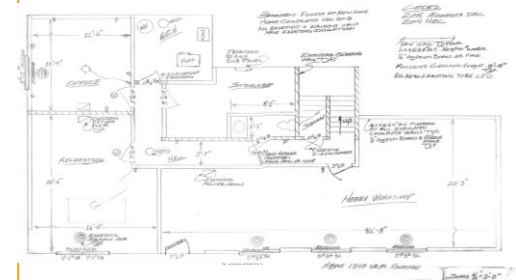


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Let's look at a typical basement finish plan

Framing details



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Let's look at a typical basement finish plan

Insulation call out Chapter 11



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N1111.1(R503.1) General

Alterations to any building or structure shall comply with the requirements of the code for new construction, without requiring the unaltered portions of the existing building or building system to comply with this chapter. Alterations shall be such that the existing building or structure is not less conforming with the provisions of this chapter than the existing building or structure was prior to the alteration.

Alterations shall not create an unsafe or hazardous condition or overload existing building systems. Alterations shall be such that the existing building or structure does not use more energy than the existing building or structure prior to the alteration. Alterations to existing buildings shall comply with Sections N1111.1.1 through N1111.1.4.

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Energy code considerations

- Insulation in below grade exterior walls table N1102.1.3 based on Climate zone
- U value of windows (new windows)
- Systems requirements (N1103)
- Lighting controls (N1104.2)
- High efficacy lighting requirements (N1104.1)
- Fuel burning fireplaces: (N1102.4.4)
- Prescriptive compliance is the only choice here unless re-evaluating the entire house.

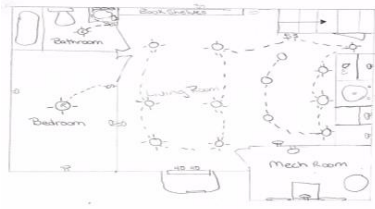
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Let's look at a typical basement finish plan

Light and ventilation? R325

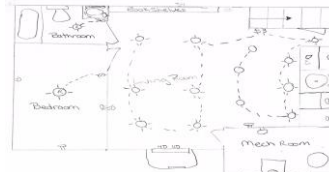


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R325.1 Habitable rooms

Habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural ventilation shall be through windows, skylights, doors, louvers or other approved openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The openable area to the outdoors shall be not less than 4 percent of the floor area being ventilated



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R303.1 Habitable rooms

Exceptions:

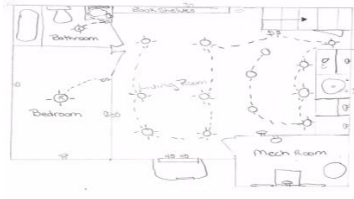
1. For habitable rooms other than kitchens, the glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical ventilation system or a mechanical ventilation system capable of producing 0.35 air changes per hour in the habitable rooms is installed in accordance with Section M1505.
2. For kitchens, the glazed areas need not be openable where the opening is not required by Section R310 and a local exhaust system is installed in accordance with Section M1505.
3. The glazed areas need not be installed in rooms where Exception 1 is satisfied and artificial light is provided that is capable of producing an average illumination of 6 footcandles over the area of the room at a height of 30 inches above the floor level.
4. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural ventilation if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

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Let's look at a typical basement finish plan

Bathroom Exhaust fan? R303 & chapter 15



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R303.3 Bathrooms

Bathrooms, water closet compartments and other similar rooms shall be provided with aggregate glazing area in windows of not less than 3 square feet, one-half of which shall be openable.

Exception: The glazed areas shall not be required where artificial light and a local exhaust system are provided. The minimum local exhaust rates shall be determined in accordance with Section M1505. Exhaust air from the space shall be exhausted directly to the outdoors.

TABLE M1505.4.4 MINIMUM REQUIRED LOCAL EXHAUST RATES FOR ONE- AND TWO-FAMILY DWELLINGS

AREA TO BE EXHAUSTED	EXHAUST RATES*
Kitchens	100 cfm intermittent or 20 cfm continuous
Bathrooms/Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

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Basement Finish

- DOCUMENTS TO SUBMIT
 - FLOOR PLAN
 - CURRENT OR EXISTING FLOOR PLAN
 - PROPOSED FLOOR PLAN
- ENGINEERING LETTER
 - EGRESS WINDOW
 - STRUCTURAL Changes required?

ATTACH BASEMENT FINISH BUILDING GUIDE

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Basement finish plan

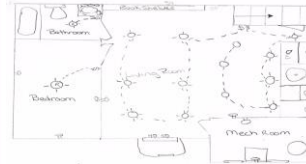
- Ceiling height not < 7'
- Shower size? P2708.1
- Shower not less than 900 Sq in. with no measurement less than 30" and wall protection no less than 72" AFF
- Shower Door shall swing out—why?
- Access in front of opening at least 24"
- Shower door 22" min



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Hazardous glazing locations

- IRC section R324.4
- By stairs
- Tubs/showers/wet areas
- By doors
- Proximity to floors <18" AFF & >9" & top edge is >36" AFF



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Laundry and/or mechanical rooms

- Laundry rooms:
 - Not habitable space by definition
 - Ceiling height a minimum of 6'-8"
 - Clothes dryer exhaust reqd. chapter 15 & G2439
 - Make up air required if dryer exhaust is more than 200 CFM. G2439.5
 - Max exhaust length 35' with deductions for fittings or per manufacturers instructions
- Mechanical rooms:
 - Maintain combustion air
 - Maintain clearance of 30" clear in front of equipment
 - Maintain clearances to B vents and equipment
 - Direct vent appliances or insulate room to separate from conditioned spaces

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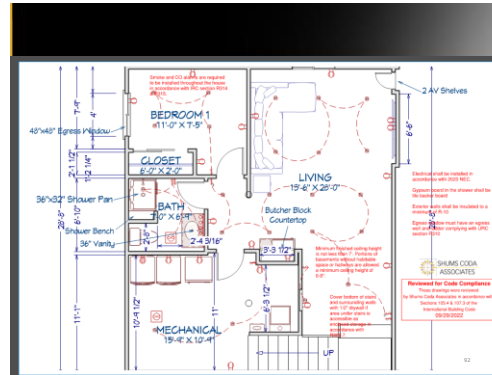
90

More considerations?

- Other equipment and rooms?
- Indoor spas
- Exercise rooms
- Theater rooms
- Bars
- Golf rooms
- Archery rooms
- Pistol range
- Bowling alley
- Hockey rink



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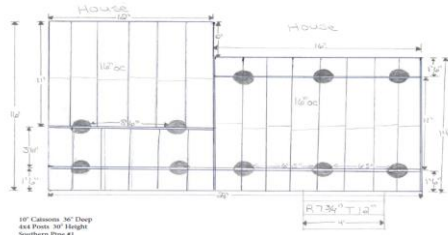
92

BASEMENT FINISH QUESTIONS?



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Exterior Decks R507



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Code sections for decks R507

- Uniform live loads: R301.5
- Dead load added by hot tubs!
- Footings (piers) R507.3
- Materials R507.2
- Posts & connection to piers R507.4
- Ledger Connection to Band Joist – R507.9.1.1
- Placement of Lag Screws and Bolts in Deck Ledgers – table 507.9.1.3(2)
- Joist Spacing – R507.6
- Joist Spans by Lumber Species – R507.6
- Deck Beams Span Lengths – R507.5
- Deck Post Height – R507.4
- Guardrails R507.10
- Stairs R311.7



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DECK SUBMITTAL DOCUMENTS



- SITE PLAN FSD table R302.1(1)
- FLOOR/Structural PLAN
 - BEAMS
 - JOISTS
 - POSTS
 - LEDGER BOARD
 - CASSIONS
- Elevations

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Deck terms and location

- PIER (CASSION) – ORANGE
- Must extend to frost depth?
- Must extend above grade

FIGURE RB87.2 DECK POSTS TO DECK FOOTING CONNECTION

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Deck terms and location

- PIER (CASSION) - ORANGE
- POST - BLUE

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Deck terms and location

- PIER (CASSION) - ORANGE
- POST - BLUE
- BEAM - GREEN

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Deck terms and location

- PIER (CASSION) - ORANGE
- POST - BLUE
- BEAM - GREEN
- LEDGER BOARD - PURPLE

The diagram shows a side view of a deck structure. A vertical orange pier is attached to a house. A blue post is attached to the pier. A green beam is attached to the post. A purple ledger board is attached to the house and the beam. The house is labeled 'HOUSE'.

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Deck terms and location

- PIER (CASSION) - ORANGE
- POST - BLUE
- BEAM - GREEN
- LEDGER BOARD - PURPLE
- JOIST - RED

The diagram shows a side view of a deck structure. A vertical orange pier is attached to a house. A blue post is attached to the pier. A green beam is attached to the post. A purple ledger board is attached to the house and the beam. Red joists are attached to the beam. The house is labeled 'HOUSE'.

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Let's review the deck plan

- No dimensions to PL given --can we scale it?

The diagram shows a hand-drawn deck plan. A yellow box highlights a section of the deck. The plan shows a deck layout with a house and a deck. The house is labeled 'HOUSE'.

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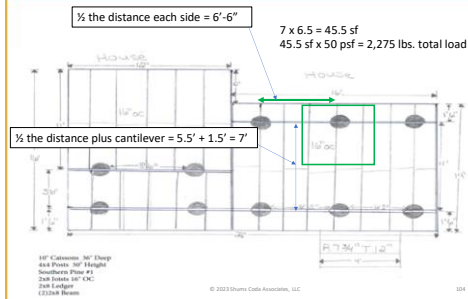
102

DECK SUBMITTAL DOCUMENTS



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Look at layout and determine tributary area



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Loads

R301.4 Dead load
The actual weights of materials and construction shall be used for determining dead load with consideration for the dead load of fixed service equipment.



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Loads

TABLE R301.5 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

USE	UNIFORM LOAD (psf)	CONCENTRATED LOAD (lb)
Uninhabitable attics without storage ^b	10	—
Uninhabitable attics with limited storage ^{b, 9}	20	—
Habitable attics and attics served with fixed stairs	30	—
Balconies (exterior) and decks ^a	40	—
Fire escapes	40	—
Guards	—	200 ^{b, 1}
Guard in-fill components ²	—	50 ^b
Handrail ²	—	200 ^b
Passenger vehicle garages ^a	50 ^a	2,000 ^a
Areas other than sleeping areas	40	—
Sleeping areas	30	—
Stairs	40 ^c	300 ^c

e. See Section R507.1 for decks attached to exterior walls

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Size the piers

TABLE R507.3.1 MINIMUM FOOTING SIZE FOR DECKS

LIVE OR SNOW LOAD ¹ (psf)	TRIBUTARY AREA (ft ²)	LOAD-BEARING VALUE OF SOILS ^{2, 3, 4} (psf)								
		1. LBFP		2. SBFP		3. LBFP				
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
5	7	6	6	7	6	6	7	6	6	6
20	10	10	6	9	9	9	10	8	8	6
40	14	14	6	12	14	8	10	12	6	6
60	17	17	6	13	17	6	12	14	6	6
80	20	20	7	17	19	6	14	16	6	6
100	22	23	8	19	23	8	16	17	6	6
120	24	27	9	21	25	7	17	18	6	6
140	26	29	10	23	27	8	18	21	6	6
160	28	31	11	24	27	9	20	22	7	6

Interpolation reveals that a 14.25" pier would work.
 45.5 actual sf/60 tabular SF = 75.83%
 19" pier x 75% = 14.25" pier



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- a. Interpolation permitted, extrapolation not permitted.
- b. Based on highest load case: Dead + Live or Dead + Snow.

LIVE OR GROUND SNOW LOAD ¹ (psf)	TRIBUTARY AREA (ft ²)	LOAD-BEARING VALUE OF SOILS ^{2, 3, 4} (psf)								
		1,500 ^a			2,000 ^a			≥ 3,000 ^a		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
50	5	7	8	6	7	8	6	7	8	6
	20	11	13	6	10	11	6	8	9	6
	40	15	17	6	13	15	6	11	13	6
	60	19	21	6	16	18	6	13	15	6
	80	21	24	8	19	21	6	15	17	6
	100	24	27	9	21	23	7	17	19	6
	120	26	30	10	23	26	8	19	21	6
	140	28	32	11	25	28	9	20	23	7
	160	30	34	12	26	30	10	21	24	8

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R507.9.1.1 Ledger details

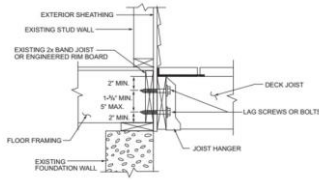


FIGURE R507.9.1.3(2) PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS

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R507.9.1.1 Ledger details

Deck ledgers shall be a minimum 2-inch by 8-inch nominal, pressure-preservative-treated Southern pine, incised pressure-preservative-treated hem-fir, or approved, naturally durable, No. 2 grade or better lumber (cedar, redwood or similar). Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

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R507.9.1.2 Band joist details

Band joists supporting a ledger shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch nominal engineered wood rim boards in accordance with Section R502.1.7. Band joists shall bear fully on the primary structure capable of supporting all required loads.

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R507.9.1.3 Ledger to band joist details

Fasteners used in deck ledger connections in accordance with Table R507.9.1.3(1) shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.9.1.3(2) and Figures R507.9.1.3(1) and R507.9.1.3(2).

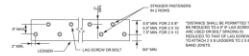


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Ledger support



For SI: 1 inch = 25.4 mm.

FIGURE R507.9.1.3(1) PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

TABLE R507.9.1.3(2) PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

	MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS			
	TOP EDGE	BOTTOM EDGE	EDGE	BOW SPACING
Lag screw ^a	2 inches ^b	1 1/2 inches	2 inches ^c	1 1/2 inches ^d
Bolt with nut ^e	2 inches ^b	2 inches	2 inches ^c	1 1/2 inches ^d

^a Lag screws shall be staggered from the top to the bottom along the full length of the deck ledger in accordance with [Table R507.9.1.3\(1\)](#).
^b Minimum values.
^c The minimum values shall be maintained in accordance with [Table R507.9.1.3\(1\)](#).
^d The minimum values shall be maintained in accordance with [Table R507.9.1.3\(1\)](#).
^e The minimum values shall be maintained in accordance with [Table R507.9.1.3\(1\)](#).

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TABLE R507.9.1.3(1) DECK LEDGER CONNECTION TO BAND JOIST

LOAD ^a (psf)	JOIST SPAN ^b (feet)	ON-CENTER SPACING OF FASTENERS ^b (inches)		
		1/2-inch diameter lag screw with 1/2-inch maximum sheathing ^c	1/2-inch diameter bolt with 1/2-inch maximum sheathing ^c	1/2-inch diameter bolt with 1-inch maximum sheathing ^c
40 live load	6	30	36	36
	8	23	36	36
	10	18	34	29
	12	15	29	24
	14	13	24	21
	16	11	21	18
	18	10	19	16

- a. Interpolation permitted. Extrapolation is not permitted.
- b. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- c. Dead Load = 10 psf. Snow load shall not be assumed to act concurrently with live load.
- d. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- e. Sheathing shall be wood structural panel or solid sawn lumber.
- f. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

114

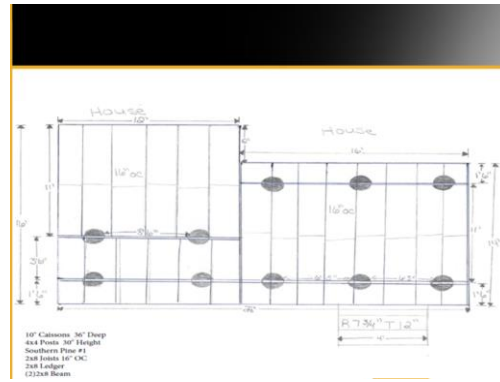
Hot tub how much does It weigh?

- Typical 8' x 8' 6 person hot tub empty= 875#
- 380 Gallons of water at 8.33# /gallon= 3165.4#
- 6 people figure an average weight of 160# = 960#
- Total live and dead load added by hot tub = 4200# ? 64 SF=65# PSF
- Deck was designed for a uniform Live load of 40# and no dead load....now what?
- It is outside of prescriptive loads in the code so it must be on a slab or have an engineered deck design.



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Beam size


- Plan calls for /southern Pine #1-- 2-2x8 beam
- Span between posts is 6'-5"
- apply table R507.5(1)

BEAM SPECIES ^a	BEAM SIZE ^a	EFFECTIVE DECK JOIST SPAN LENGTH ^{b, c, d} (feet)						
		6	8	10	12	14	16	18
		MAXIMUM DECK BEAM SPAN LENGTH (feet-inches) ^{b, c, d}						
Southern pine	1-2 x 6	4-7	4-0	3-7	3-3	3-0	2-10	2-8
	1-2 x 8	5-11	5-1	4-7	4-2	3-10	3-7	3-5
	1-2 x 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1-2 x 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2-2 x 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2-2 x 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2-2 x 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2-2 x 12	12-2	10-7	9-5	8-7	8-0	7-5	7-0
	3-2 x 6	8-8	7-5	6-8	6-1	5-8	5-3	4-11
	3-2 x 8	10-11	9-6	8-6	7-9	7-2	6-8	6-4
3-2 x 10	13-0	11-2	10-0	9-2	8-6	7-11	7-6	
3-2 x 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10	

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Guards





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Guards

R312.1.1 Where required
 Guards shall be provided for those portions of open-sided walking surfaces, including floors, stairs, ramps and landings that are located more than 30 inches measured vertically to the floor or grade below at any point within 36 inches horizontally to the edge of the open side. Insect screening shall not be considered as a guard.

R312.1.2 Height
 Required guards at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches in height as measured vertically above the adjacent walking surface or the line connecting the nosings.

R312.1.3 Opening limitations
 Required guards shall not have openings from the walking surface to the required guard height that allow passage of a sphere 4 inches in diameter.



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R507.10 Exterior guards

R507.10.1 Support of guards
 Where guards are supported on deck framing, guard loads shall be transferred to the deck framing with a continuous load path to the deck joists.

R507.10.1.1 Guards supported by side of deck framing
 Where guards are connected to the interior or exterior side of a deck joist or beam, the joist or beam shall be connected to the adjacent joists to prevent rotation of the joist or beam. Connections relying only on fasteners in end grain withdrawal are not permitted.

R507.10.1.2 Guards supported on top of deck framing
 Where guards are mounted on top of the decking, the guards shall be connected to the deck framing or blocking and installed in accordance with manufacturer's instructions to transfer the guard loads to the adjacent joists



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R507.10 Exterior guards

R507.10.2 Wood posts at deck guards

Where 4-inch by 4-inch wood posts support guard loads applied to the top of the guard, such posts shall not be notched at the connection to the supporting structure.

R507.10.3 Plastic composite guards

Plastic composite guards shall comply with the provisions of Section R507.2.2.

R507.10.4 Other guards

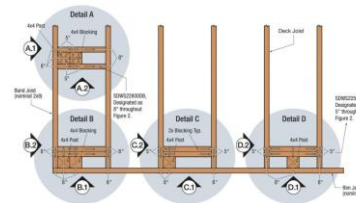
Other guards shall be in accordance with either manufacturer's instructions or accepted engineering principles.



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https://www.jlconline.com/deck-builder/foolproof-guard-posts_o



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Stairs R318.7



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Stairs

- R318.7.1 Width.
- Stairways shall be not less than 36 inches in clear width at all points above the permitted handrail height and below the required headroom height. The clear width of stairways at and below the handrail height, including treads and landings, shall be not less than 31 1/2 inches where a handrail is installed on one side and 27 inches where handrails are installed on both sides.
- Exception: The width of spiral stairways shall be in accordance with Section R318.7.11.1.




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Stairs

- R318.7.3 Vertical rise
- A flight of stairs shall not have a vertical rise greater than 12 feet 7 inches between floor levels or landings.
- Risers not more than 7.75" and run not less than 10".
- NO rise or run within a flight shall differ more than 3/8".

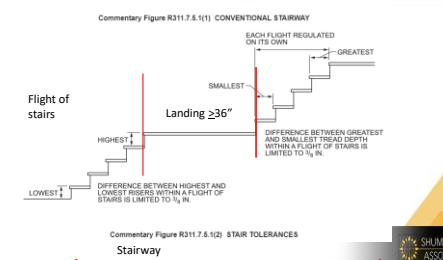


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Stairs



Commentary Figure R311.7.6 (1) CONVENTIONAL STAIRWAY

Commentary Figure R311.7.6 (2) STAIR TOLERANCES





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Stairs

- What is a flight of stairs?
- What makes up a stairway?
- What is the landing?






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Landings

- Required at top and bottom of stairs.
- Equal to width of stairs
- Depth in direction of travel not less than 36"
- Slope no greater than 1 in 48 units (2%)
- Landing shall be slip resistant as are stair treads





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Handrails—Type 1

A Type II handrail has a perimeter larger than 4 1/4 inches (110 mm) with graspable finger recess area on both sides of the profile. See [Comments Figure R310.7.3.5\(2\)](#) for the limitations of a Type II handrail.

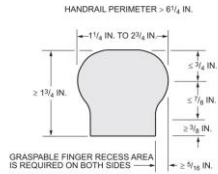




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Handrails type II



Commentary Figure R311.7.8.6(2) TYPE II HANDRAIL

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Stair handrails

- Handrails are required on one side where there are 4 or more risers
- Handrail height shall be 34 to 38" measured from the sloped plane at the nose of the tread
- Handrails shall project no more than 4.5" on either side of the stairway
- Continuous the full length of the stairway and terminate to itself or a wall or post



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Stairway Illumination 318.7.10

- Stairways shall be illuminated in accordance with 318.7.10
- Stairways shall have an artificial light source located at the top landing of a stairway
- Exception allows the light source to be installed over each individual stairway section thus eliminating lighting over landings.



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Electrical requirements at decks

- R3901.7 Balconies, decks and porches that are accessible from inside within 4 inches horizontally of the dwelling unit shall have at least one receptacle outlet accessible from the balcony, deck or porch. The receptacle shall be located not more than 6 feet 6 inches above the balcony, deck, or porch surface. [210.52(E)]



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Questions on decks?



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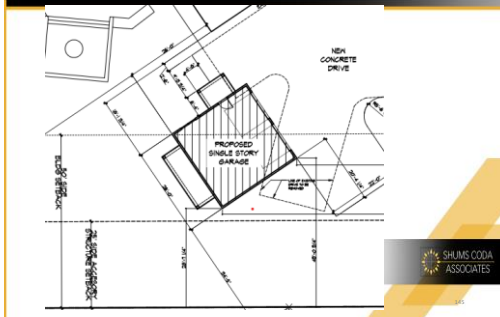
Detached Garages/sheds



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Site Plan—FSD (Fire Separation Distance)



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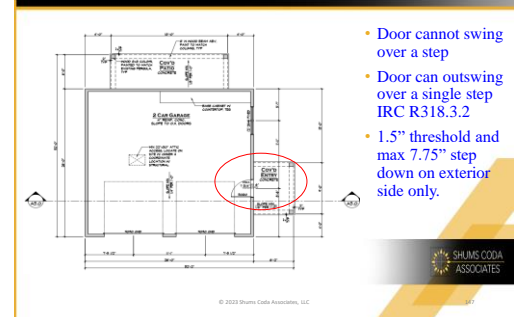
FSD table R302.6

- Garage shall be separated from the dwelling in accordance with R302.6. Wall protection provisions of table R302.6 shall not apply to walls that are perpendicular to the dwelling unit.

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

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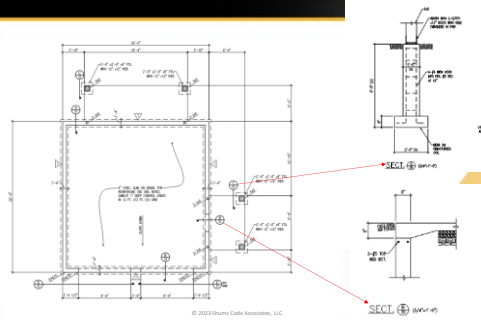
Floor plan



- Door cannot swing over a step
- Door can outswing over a single step IRC R318.3.2
- 1.5" threshold and max 7.75" step down on exterior side only.

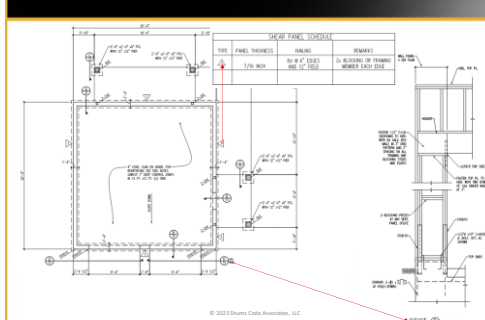
147

Foundation Plan



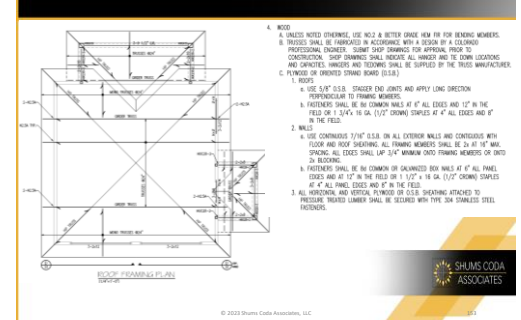
151

Foundation Plan



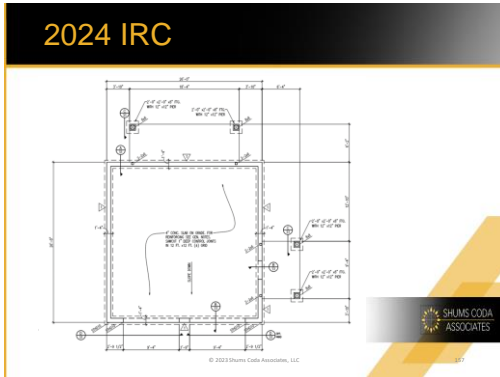
152

Framing

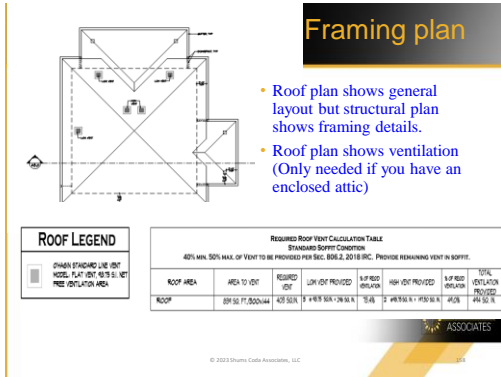


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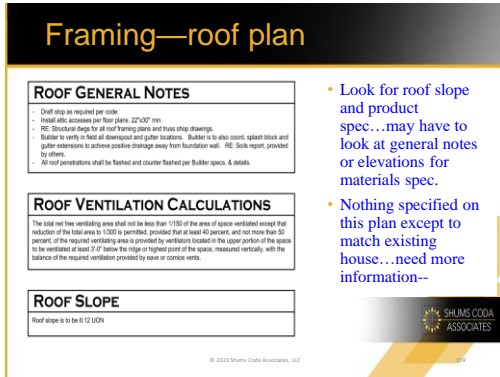




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Roof plan

- Pre-manufactured engineered roof trusses. Need layout sheet and cut sheets for trusses.

Fink (W)
- spans from 16' to 33' -

Fan (Double Fan)
- spans from 30' to 36' -

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Rafter style roof framing

- Rafters go to Table R802.4.1(1 thru8)
- Ceiling joists go to Table 802.5.1(1) is without attic storage and (2) is with limited storage.
- Truss or rafter uplift connections are typically by H2.5 clips except in rare occasions.

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Roof sheathing R803

- 7/16" osb roof sheathing or 1/2" plywood is typical for sheathing a roof with trusses or rafters at a maximum of 24" OC.

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Roof covering



- Asphalt shingles require a minimum of 2:12 roof slope and at less than 4:12 slope code requires double layer of felt paper installed shingle style in accordance with IRC R905.

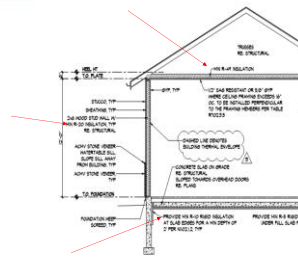


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Insulation

- If garage is to be conditioned (heated or cooled) then insulation is required but otherwise it is not.
- Table N1102.1.3 based on your climate zone.
- Look for R values in walls and attic and along slab or foundation edge.



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Insulation

CLIMATE ZONE	FENESTRATION U-FACTOR ¹⁾	SKYLIGHT ¹⁾ U-FACTOR	GLAZED FENESTRATION SHGC ²⁾	CEILING R-VALUE	WOOD FRAME WALL R-VALUE ³⁾	MASS WALL R-VALUE ³⁾	FLOOR R-VALUE	BASEMENT ⁴⁾ WALL R-VALUE	SLAB ⁵⁾ R-VALUE & SPACE ⁶⁾ MIN. DEPTH	CRAWL SPACE ⁷⁾ MIN. R-VALUE	
0	NR	0.75	0.25	30	13 or 08.10ci	3/4	13	0	0	0	
1	NR	0.75	0.25	30	13 or 08.10ci	3/4	13	0	0	0	
2	0.40	0.65	0.25	49	13 or 08.10ci	4/6	13	0	0	0	
3	0.30	0.55	0.25	49	or 13.8.10ci ⁸⁾ or 08.10ci ⁸⁾	2/3	8/13	19	5ci or 13"	10ci, 2 ft	5ci or 13"
4 except Marine 4	0.30	0.55	0.40	60	20.85ci ⁸⁾ or 13.8.10ci ⁸⁾ or 08.20ci ⁸⁾	3/5	8/13	19	10ci or 13"	10ci, 4 ft	10ci or 13"
5 and Marine 4	0.30	0.55	0.40	60	20.85ci ⁸⁾ or 13.8.10ci ⁸⁾ or 08.20ci ⁸⁾	3/5	13/17	30	15ci or 19" or 13.85ci	10ci, 4 ft	15ci or 19" or 13.85ci
6	0.30	0.55	NR	60	20.85ci ⁸⁾ or 13.8.10ci ⁸⁾ or 08.20ci ⁸⁾	3/5	19/20	30	15ci or 19" or 13.85ci	10ci, 4 ft	15ci or 19" or 13.85ci
7 and 8	0.30	0.55	NR	60	30 or 20.85ci ⁸⁾ or 13.8.10ci ⁸⁾ or 08.20ci ⁸⁾	3/5	19/21	38	15ci or 19" or 13.85ci	10ci, 4 ft	15ci or 19" or 13.85ci

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Questions about garages/sheds?



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Questions about the meaning of life? or comments?





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