BOABC – 2025 BCBC Lunch and Learn

Deck Design
Footing to Final

Presented - February 20, 2025 (Rev Feb 24/25)

Hosted by: Ken Kunka, AScT BCQ

Promoting Building Safety and Professionalism

Overview

Information presented today does not directly represent the opinions of the Building Officials Association of BC (BOABC) or Building Standards and Safety Branch (BSBS).

This presentation is conceptual and for informal educational purposes only. The presenter and association takes no responsibility for application of any concepts or interpretations in this presentation to specific projects.

The slides must not be considered complete or exhaustive. Code provisions have been generally represented and may not reflect all exceptions.

Rules of the Room

- Registration will be tracked
- Presentation is not recorded but PowerPoint will be posted
- Please use raise hand icon if you have a question or comment
- PUT IT in the CHAT
- Please mute your microphone
- You may need to turn off your camera
- Please follow up by email if you have specific question or example to share with the membership.
    - kkunka@boabc.org

Poll Questions

Poll Question #1

What is your level of BOABC Qualification?

- Level 01 Building = 27%
- Level 02 Building = 20%
- Level 03 Building = 47%
- Level 01 Plumbing = 2%
- Level 02 Plumbing = 2%
- Other = 3%
  - Retired, professional, etc

126 Responses

Poll Question #2

What region are you from?

- Lower Mainland = 43%
- South Central Interior = 17%
- Kootenay = 13%
- Northwest = 4%
- Central North Interior = 4%
- Vancouver Island North = 11%
- Vancouver Island South = 8%

February 20, 2025
Deck Design – Footings to Final

Today's Session

- What's New Update and Training
- Members Questions
- Deck Design
  - Information sources
  - Minimum Permit requirements
  - Foundation and Columns
  - Framing – the Ledger
  - Guards - glass
  - Other Code References
- Q & A

Education Focus – Level 01

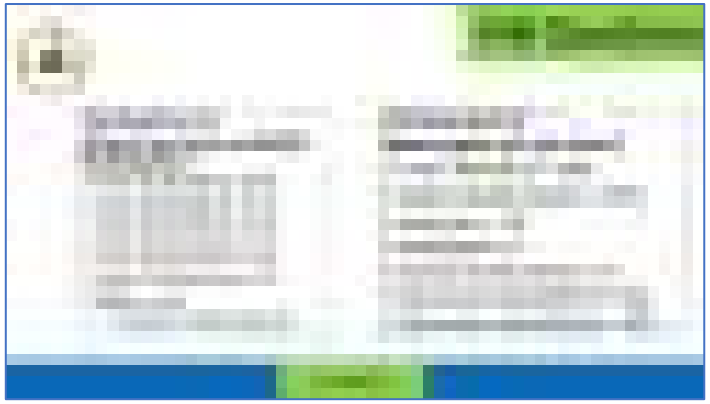
January 16th – Start of Year Rooftop (roof-top) Occupancies

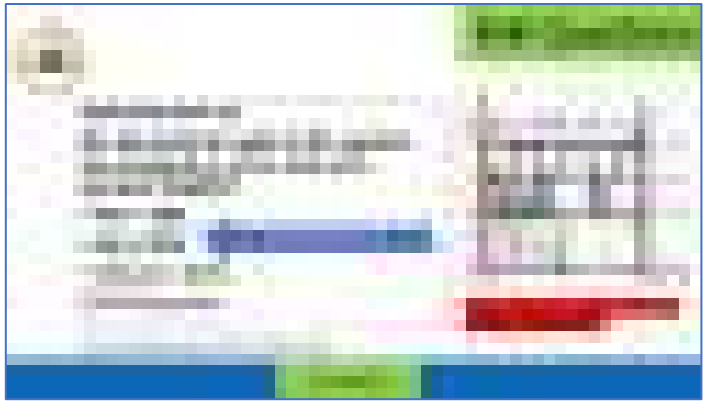
Session

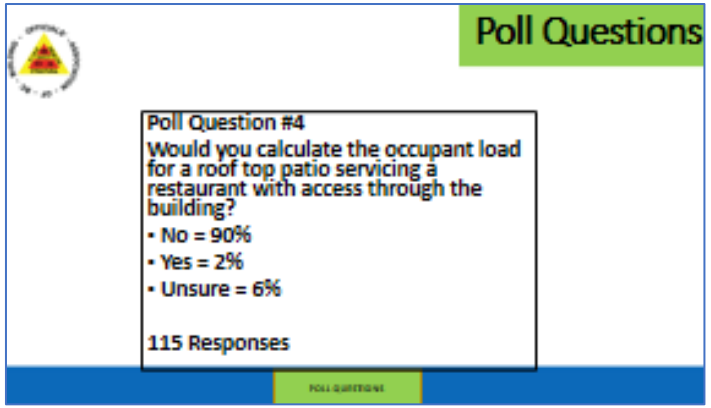
- What's New Update and Training
- Members Questions
- Rooftop Occupancies
  - Background
  - Occupant
  - Building Height
  - Means of Egress
  - Case Example
  - Other Code References
- Q & A

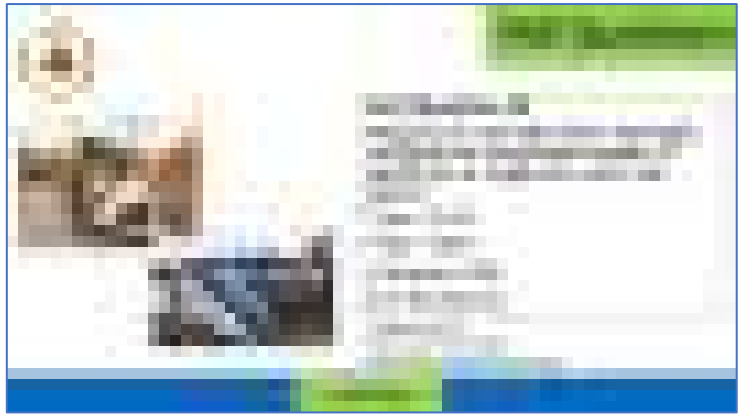
Education Focus – All Levels

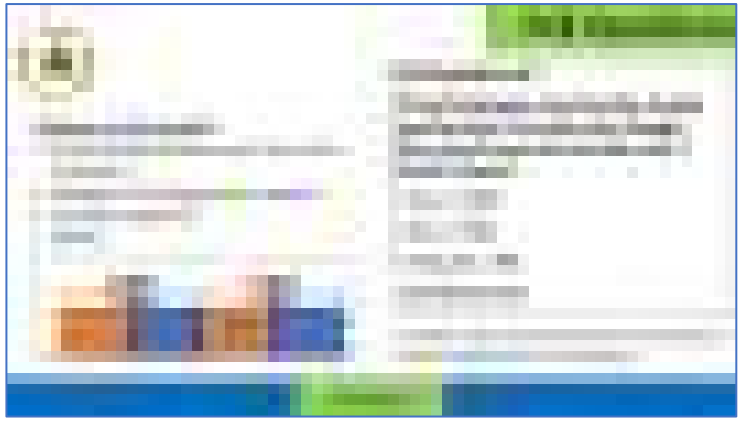
December – Poll Question Results











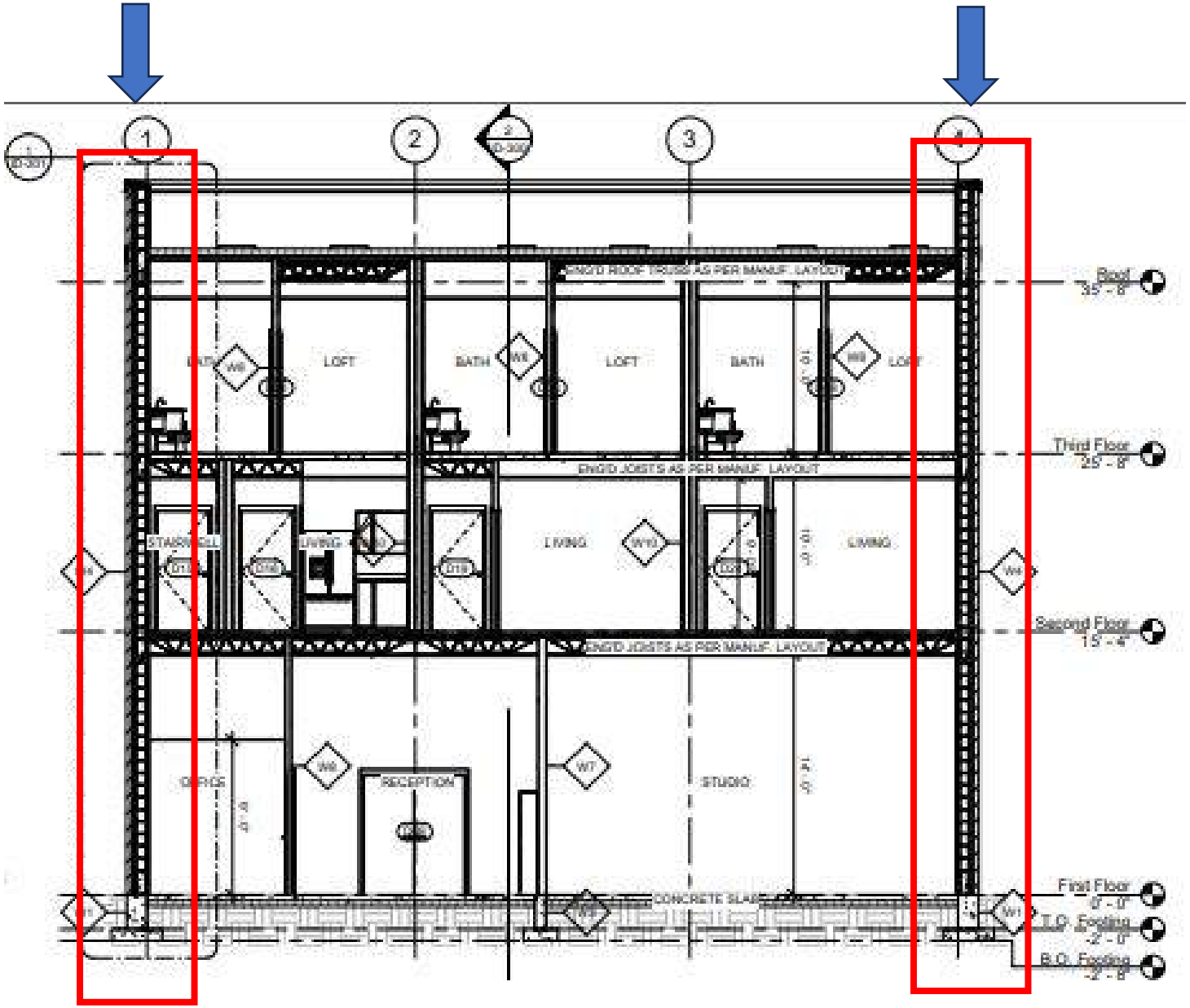
Members Question Recap

Exterior wall as a Firewall?

Proposed project of a 3-storey mixed use (commercial and residential building) under Part 9 classification.

- The building goes up to the property line but not over (zero limiting distance).

Question - Do the exterior walls at PL need to be designed as a fire wall with parapet heights?



Members Question

Code References

Table 9.10.14.5.-A
Minimum Construction Requirements for Exposing Building Faces
Forming Part of Sentence 9.10.14.5.(1)

Occupancy Classification of Building or Fire Compartment	Maximum Area of Unprotected Openings Permitted, % of Exposing Building Face Area	Minimum Required Fire-Resistance Rating	Type of Construction Required	Type of Cladding Required
Residential, business and personal services, and low-hazard industrial	0 to 10	1 h	Noncombustible	Noncombustible
	> 10 to 25	1 h	Combustible or noncombustible	Noncombustible
	> 25 to 50	45 min	Combustible or noncombustible	Noncombustible
	> 50 to < 100	45 min	Combustible or noncombustible	Combustible or noncombustible
Mercantile and medium-hazard industrial	0 to 10	2 h	Noncombustible	Noncombustible
	> 10 to 25	2 h	Combustible or noncombustible	Noncombustible
	> 25 to 50	1 h	Combustible or noncombustible	Noncombustible
	> 50 to < 100	1 h	Combustible or noncombustible	Combustible or noncombustible

9.10.11. Firewalls

9.10.11.1. Required Firewalls

1) Except as provided in Article 9.10.11.2., a party wall on a property line shall be constructed as a firewall. (See Note A-3.2.3.4.(1).)

9.10.11.2. Firewalls Not Required

Duplex over PL

1) A party wall on a property line of a building of residential occupancy need not be constructed as a firewall, provided it is constructed as a fire separation having not less than a 1 h fire-resistance rating, where the party wall separates

a) two dwelling units where there is no dwelling unit above another dwelling unit,

b) a dwelling unit and a house with a secondary suite including their common spaces, or

c) two houses with a secondary suite including their common spaces.

2) Reserved.

3) The wall described in Sentence (1) shall provide continuous protection from the top of the footings to the underside of the roof deck.

4) Any space between the top of the wall described in Sentence (1) and the roof deck shall be tightly filled with mineral wool or noncombustible material.

9.10.11.3. Construction of Firewalls

1) Where firewalls are used, the requirements in Part 3 shall apply.

Poll Questions

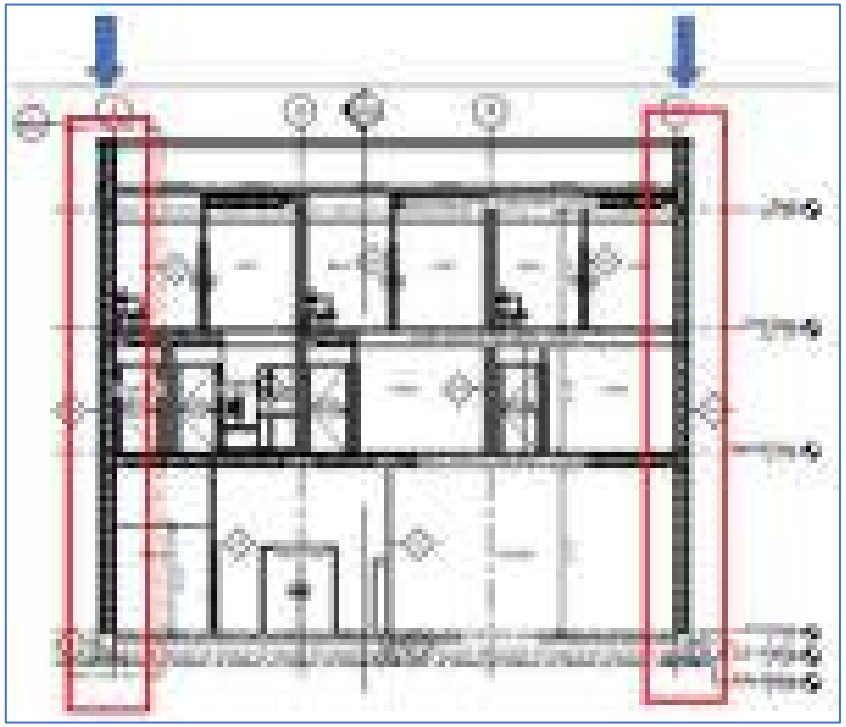
Poll Question #3

Do the exterior walls at PL need to be designed as a fire wall with parapet heights?

- **Yes = 42%**
- **No =35 %**
- **Unsure = 21%**

126 Responses

Exterior side walls up to the PL not on or over.



These exterior walls are not considered fire walls (footings to be L-shaped to not cross PL) To review spatial and fire wall requirements for 0 to 1.2m LD at March LL

Don’t Forget BOABC Conference 2025

Don’t Forget National Code Updates

National Codes Public Review: Overheating

I encourage you to participate in the final review of proposed changes to the 2020 National Model Codes. The proposed changes in this public review address overheating in the National Building Code of Canada. **The review is open until February 24, 2025.** You can find more information on the Canadian Board for Harmonized Construction Codes website.

If you have any questions, please email Building.Safety@gov.bc.ca

Sincerely,

Aman Gill
Acting Executive Director
Building and Safety Standards Branch
Ministry of Housing and Municipal Affairs
Province of British Columbia

Don’t forget – Code Update

Information Bulletin

Building and Safety Standards Branch

PO Box 9844 Stn Prov Govt
Victoria BC V8W 9T2
Email: building.safety@gov.bc.ca
Website: www.gov.bc.ca/buildingcodes

BRITISH COLUMBIA
www.gov.bc.ca

No. B24-10-R
September 20, 2024

Application of the 2024 BC Building Code

This bulletin provides information about changes to the effective date for seismic and adaptable dwelling unit requirements in the British Columbia Building Code (BC Building Code) 2024[1]. Information in Bulletins B24-01-R Adaptable Dwellings Transition and B24-02-R Seismic Design Delay have been updated to reflect the extended effective date.

The BC Building Code 2024 came into effect for projects with building permits applied for after March 8, 2024; however, seismic and adaptable dwelling unit provisions in the BC Building Code 2018 edition remained in effect for projects with building permits applied **for before March 10, 2025**. Previously, projects with building permits applied for **on or after March 10, 2025**, would need to comply with the entirety of the BC Building Code 2024 including the seismic and adaptable dwelling unit requirements.

Adaptable dwelling unit requirements apply to select residential buildings. More information on adaptable dwelling units is available in Bulletin B24-09-R2. All buildings must consider seismic loads; however, these loads differ from location to location and can impact buildings differently based on their design. More information on seismic requirements will be provided in a bulletin expected soon.

Seismic and adaptable dwelling unit requirements apply to projects as follows:

Status Quo:

If you apply for a building permit **before March 10, 2025**, the seismic and adaptable dwelling unit requirements in the BC Building Code 2018 apply to the building project. Projects for which building permits are applied for **on or after March 10, 2025**, are subject to the seismic and adaptable dwelling unit requirements in the BC Building Code 2024.

If no building permit is required and work substantially begins **before March 10, 2025**, then the seismic and adaptable dwelling unit requirements in the BC Building Code 2018 apply to the building project. Projects for which no building permit is required,

[1] Seismic requirements are found in Subsection 4.1.8., Section 9.23., and Appendix C of Division B. Adaptable dwelling unit requirements are found in Subsection 3.8.5. of Division B.

The contents of this Bulletin are not intended to be provided as legal advice and should not be relied upon as legal advice. The Building and Safety Standards Branch does not enforce compliance with the British Columbia Building Code. Local authorities are authorized to enforce the British Columbia Building Code through the Local Government Act and the Community Charter.

1

What dates do I need to remember?

November 24, 2023	Adoption of the BC Building Code 2024.
March 8, 2024	Most of the BC Building Code 2024 came into force for projects for which building permits were applied for on or after this date. Seismic and adaptable requirements in the BC Building Code 2018 edition continued to remain in effect. This is the cut-off date that the drawings described in the new options must have been prepared by (prepared before March 8, 2024) as a condition to apply the new options. Drawings prepared after this date with the intention of applying for a building permit **on or after March 10, 2025**, must comply with the entirety of the BC Building Code 2024.
March 10, 2025	The entirety of the BC Building Code 2024 comes into effect for projects for which building permits are applied for on or after this date – **unless one of the new options is applied**. (For projects that are not applying one of the new options, the entirety of the BC Building Code 2024 applies.)
March 8, 2027	Any projects applying the new options must apply for a building permit before this date. Any projects applying for a building permit on or after this date must comply with the entirety of the BC Building Code 2024.

Link - b24-10-r_application_of_the_2024_bc_building_code.pdf

New Code Item March 10, 2025

The Part 3 and Part 9 Step Code Compliance Checklists already disclose operational greenhouse gas emissions to the Authority Having Jurisdiction, so users of those checklists already comply.

Local governments retain the ability to require or incentivize compliance with higher levels of the Zero Carbon Step Code.

Decks – Footings to Final

- **Part 9 – Level 01 review**
- **2024 BC Building Code**

Session Outline

Today's session will cover the following items:

- Deck failures
- Building Code highlights

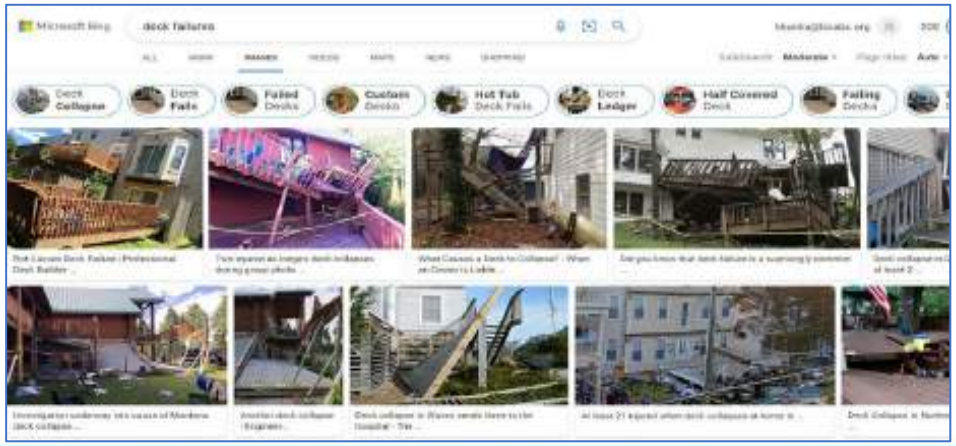
2024 BCBC

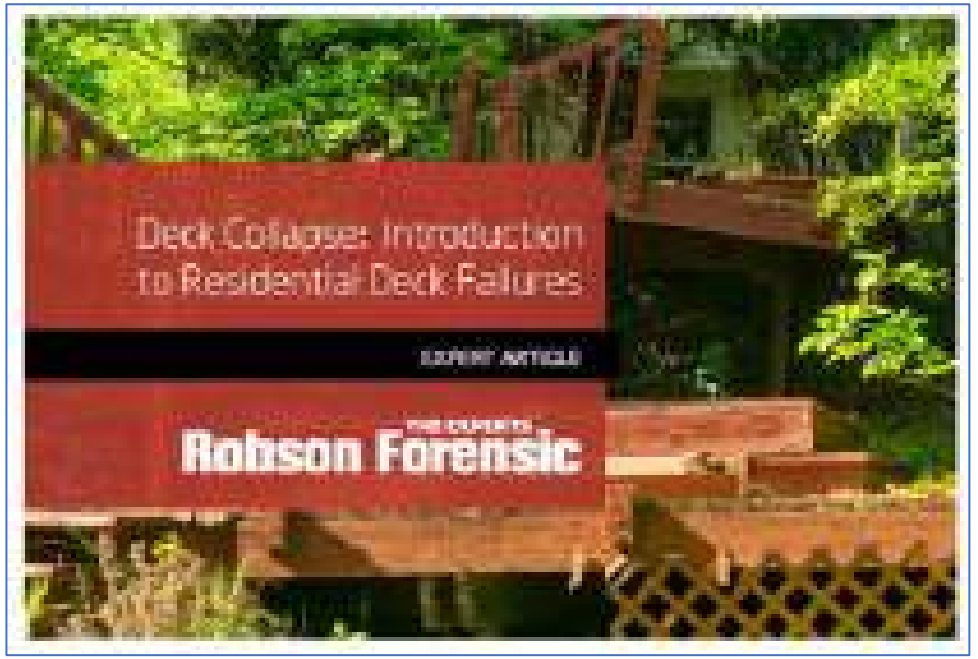
- 9.3 Materials, Systems and Equipment
- 9.4 Structural Requirements
- 9.6 Glass
- 9.8 Stairs, Ramps, Landings, Handrails and Guards
- 9.12 Excavation
- 9.15 Footings and Foundations
- 9.17 Columns
- 9.23 Wood Frame Construction
- 9.26 Roofs

Purpose

Decks failures have contributed to 6500 injuries and over 29 deaths in North America since 2003.

Today's sessions will review basic design requirements for Part 9 residential deck.





Link - Residential Deck Collapse Expert Witness

Check Your Deck® – May is Deck Safety Month®

Poll Questions

Poll Question #4

What do you believe is the major cause of deck failures?

A – 14% - Overloading – poor maintenance

B – 5% - Railings and stairs

C – 11% - Deck frame or post attachments

D – 36% - Ledgers

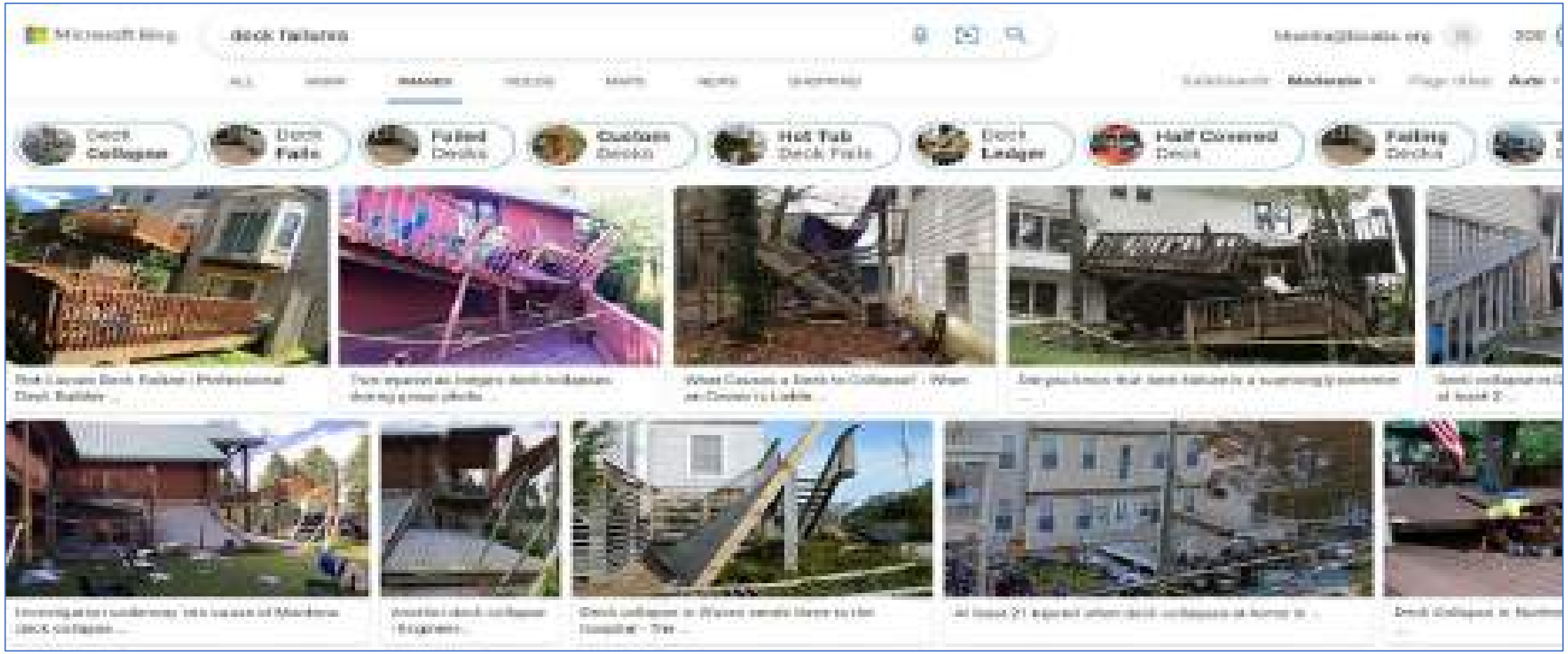
E – 32% - illegal construction/alterations

144 Responses

Poll Questions

Poll Question #4

Note that the deck diaphragm stays relatively intact – its the attachment to the building that fails.

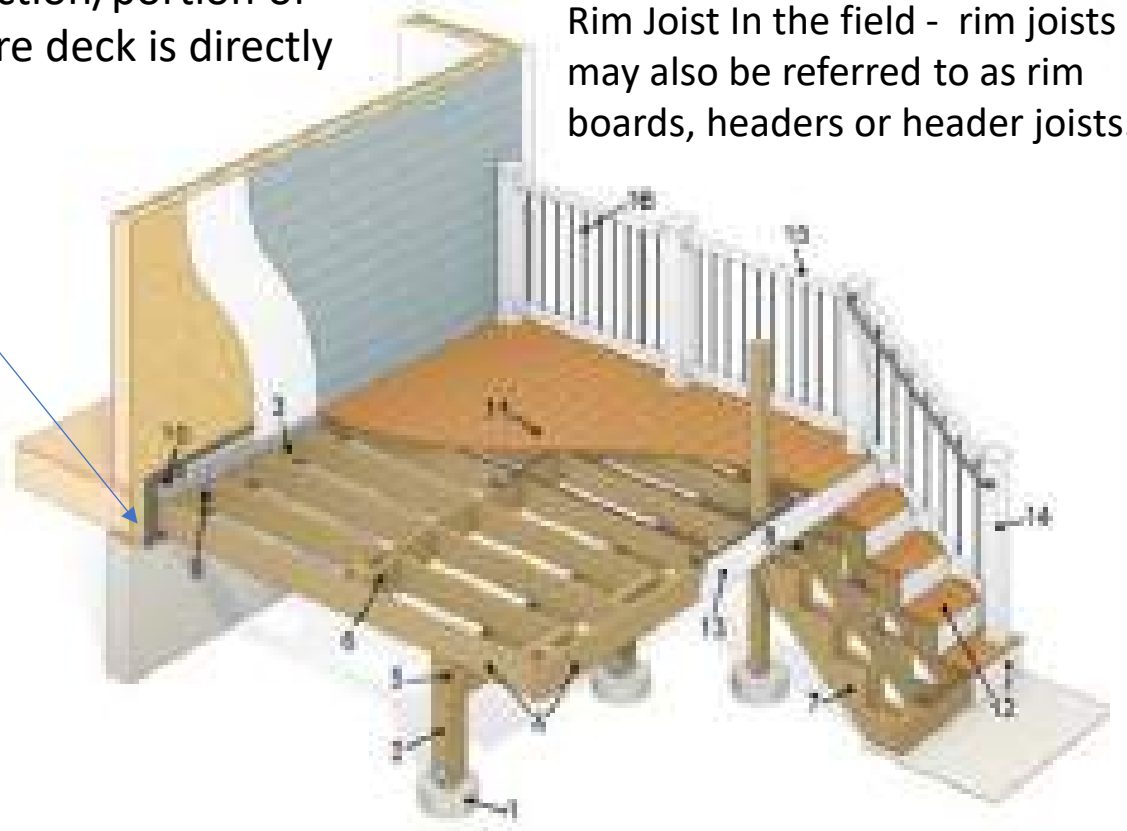


Anatomy of a Deck

1. Footings
2. Support Posts
3. Ledger
4. Joists
5. Beams
6. Blocking
7. Stair Stringers
8. Stair Header
9. Structural Hardware
10. Flashing
11. Decking
12. Stair Treads & Risers
13. Fascia
14. Railing Posts
15. Rails
16. Balusters

Rim Joist – section/portion of house to where deck is directly attached.

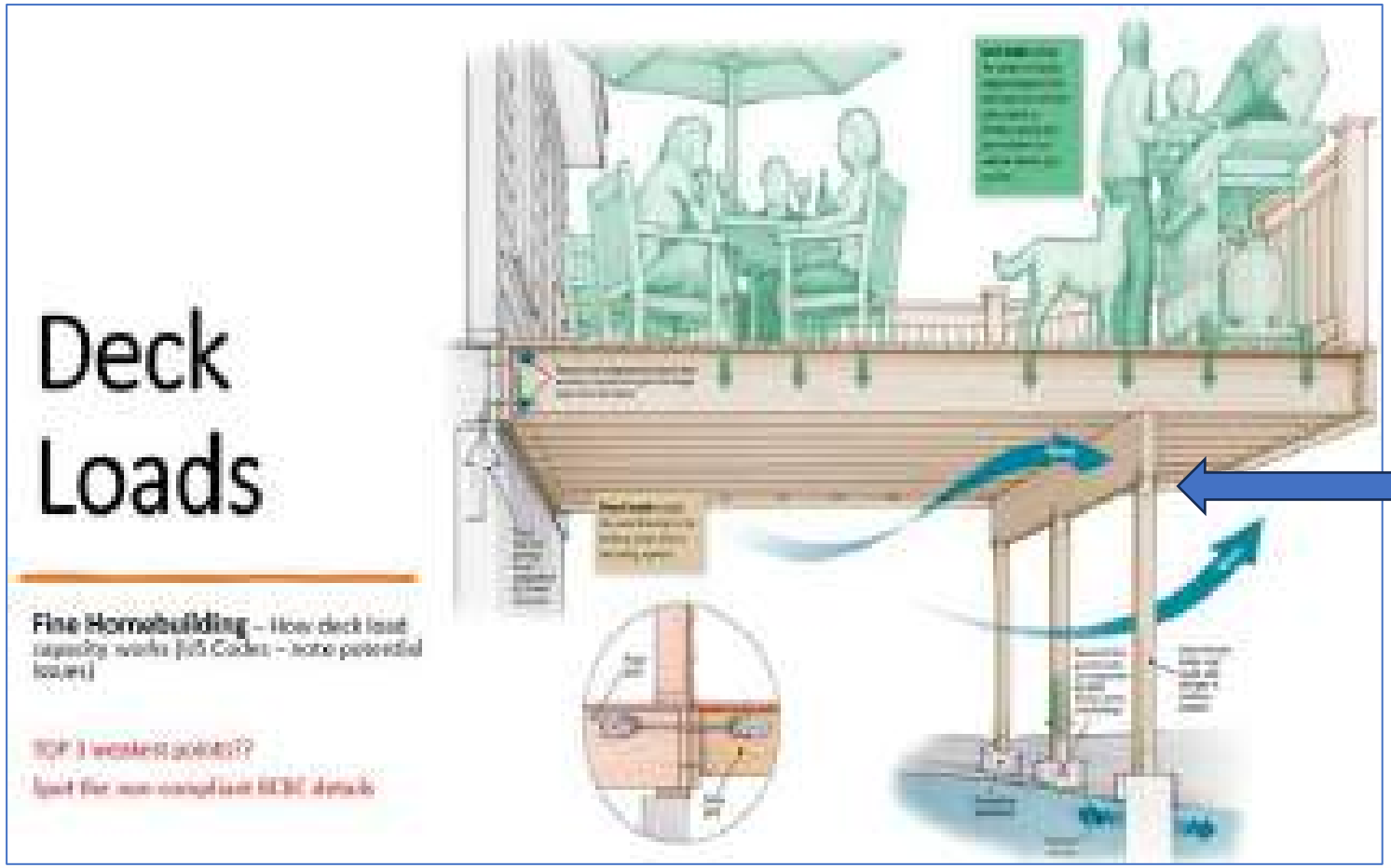
Rim Joist In the field - rim joists may also be referred to as rim boards, headers or header joists.

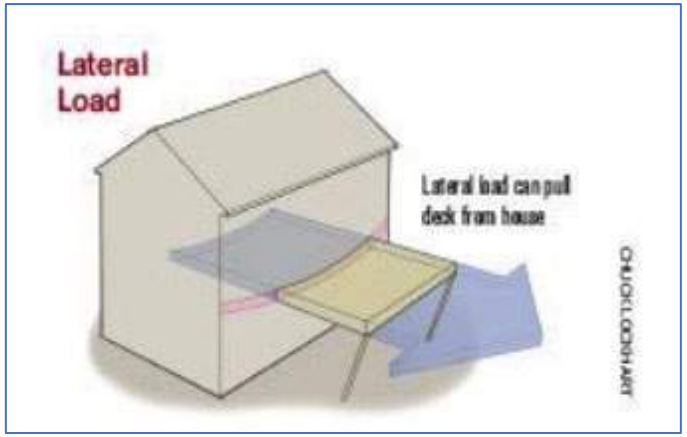


[16 Parts of a Deck (& Deck Diagram) | Decks.com]

Decks are considered a simple permit type – but can be very complex

Loads on Decks





Images from Fine Homebuilding magazine.

Not a lot of structural material below

Lateral load failures most common with inadequate ledger attachments to building. The deck diaphragm is strong but the weak points are in the connections and support below.

Loads on Decks

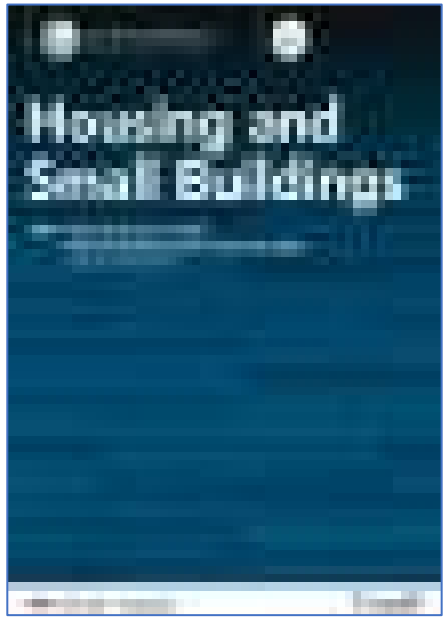
Slope Instability and Footings – 9.4

Increasing failures related to post/column rotation.

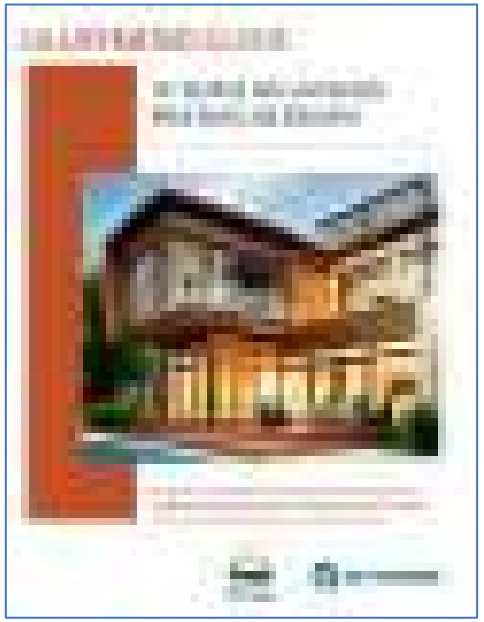
Caused by poor backfill stability on sloped lots. Some suggestions to tie deck footing back to main house foundations

Session Reference Material

Session reference material



Illustrated User's Guide – NBC 2020: Part 9 of Division B, Housing and Small Buildings



Illustrated Guide - Building Safe and Durable Wood Decks and Balconies

Technical Books – Canadian Wood Council Webstore

Prescriptive-Residential-Exterior-Wood-Deck-Span-Guide.pdf

Poll Questions

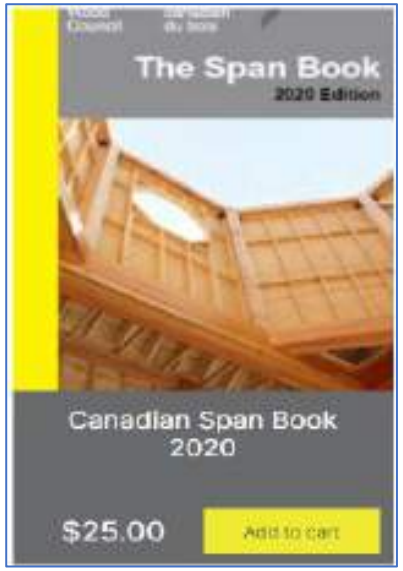
Poll Question #5

Do you use the CWC Span book for deck reviews?

- **Yes = 73%**
- **No = 21%**
- **Unsure = 1%**
- **Never heard of it = 2%**

Member comment - another great resource but not a substitute for engineering is the Timber Frame Engineering Council's span tables

Question – can an Engineer grade a timber component?



Post Session Comment

Note in 2024 BCBC - Appendix Notes 9.23.4.2. – refers to use of Span Book.

Definitions related to Decks/Balconies

Bearing surface means the contact surface between a foundation unit and the soil or rock upon which it bears.

Conditioned space means any space within a building, the temperature of which is controlled to limit variation in response to the exterior ambient temperature by the provision, either directly or indirectly, of heating or cooling over substantial portions of the year.

Dead load means the weight of all permanent structural and non-structural components of a building.

Flight means a series of steps between landings. (See Note A-1.4.1.2.(1).)

Foundation unit means one of the structural members of the foundation of a building such as a footing, raft or pile.

Frost action means the phenomenon that occurs when water in soil is subjected to freezing which, because of the water/ice phase change or ice lens growth, results in a total volume increase or the build-up of expansive forces under confined conditions or both, and the subsequent thawing that leads to loss of soil strength and increased compressibility.

Grade means the lowest of the average levels of finished ground adjoining each exterior wall of a building, except that localized depressions need not be considered in the determination of average levels of finished ground. (See First storey and Note A-1.4.1.2.(1).)

Definitions related to Decks/Balconies

Guard means a protective barrier around openings in floors or at the open sides of stairs, landings, balconies, mezzanines, galleries, raised walkways or other locations to prevent accidental falls from one level to another. Such a barrier may or may not have openings through it.

Live load means a variable load due to the intended use and occupancy that is to be assumed in the design of the structural members of a building. It includes loads due to cranes and the pressure of liquids in containers.

***Loadbearing (as applying to a building element*)** means subjected to or designed to carry loads in addition to its own dead load, excepting a wall element subjected only to wind or earthquake loads in addition to its own dead load.

Rim joist means the outermost member in floor framing, other than blocking, be it parallel, perpendicular or on an angle to the floor joists. (See Note A-1.4.1.2.(1).)

Run means the horizontal distance between two adjacent tread nosings on a stair. (See Figure A-9.8.4.-B in Note A-9.8.4. of Division B.) **- How about Rise?**

9.3 Materials, Systems and Equipment

9.3.1 Concrete

9.3.1.1. Concrete General

1) Except as provided in Sentence (2) and Articles 9.3.1.6. and 9.3.1.7., unreinforced and nominally reinforced concrete shall be designed, mixed, placed, cured and tested in accordance with the requirements for **"R" class concrete stated in Section 9 of CSA A23.1, "Concrete materials and methods of concrete construction."**

A.3.4. Compliance and enforcement
Possibly the most significant cause of problems that arise in residential concrete construction is noncompliance with this standard.

9.3 Materials, Systems and Equipment

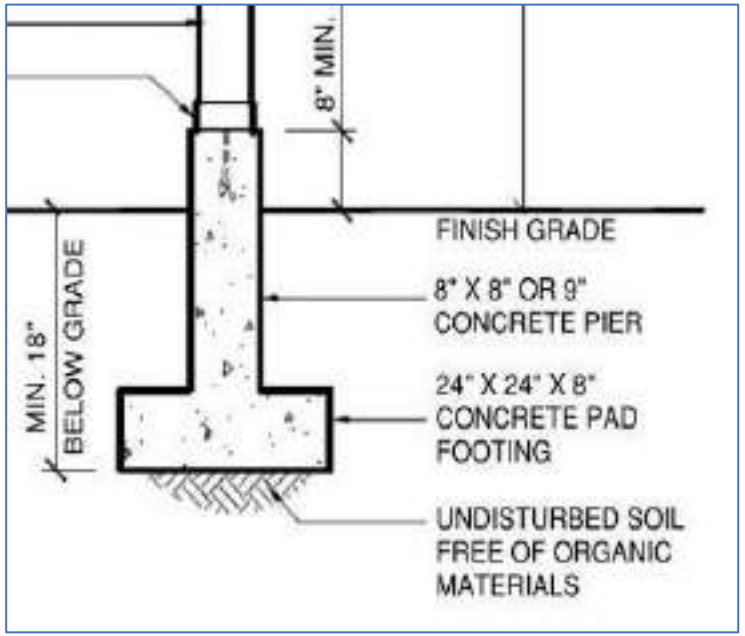
9.3.1 Concrete

9.3.1.1. Concrete General

2) Unreinforced and nominally reinforced site-batched concrete shall be designed, mixed, placed and cured in accordance with Articles 9.3.1.2. to 9.3.1.9.

***NBC Part 9** does not have the necessary controls to ensure the adequate performance of reinforced concrete. Reinforced concrete is, therefore, regulated under NBC Part 4, which provides proper design and construction practices.

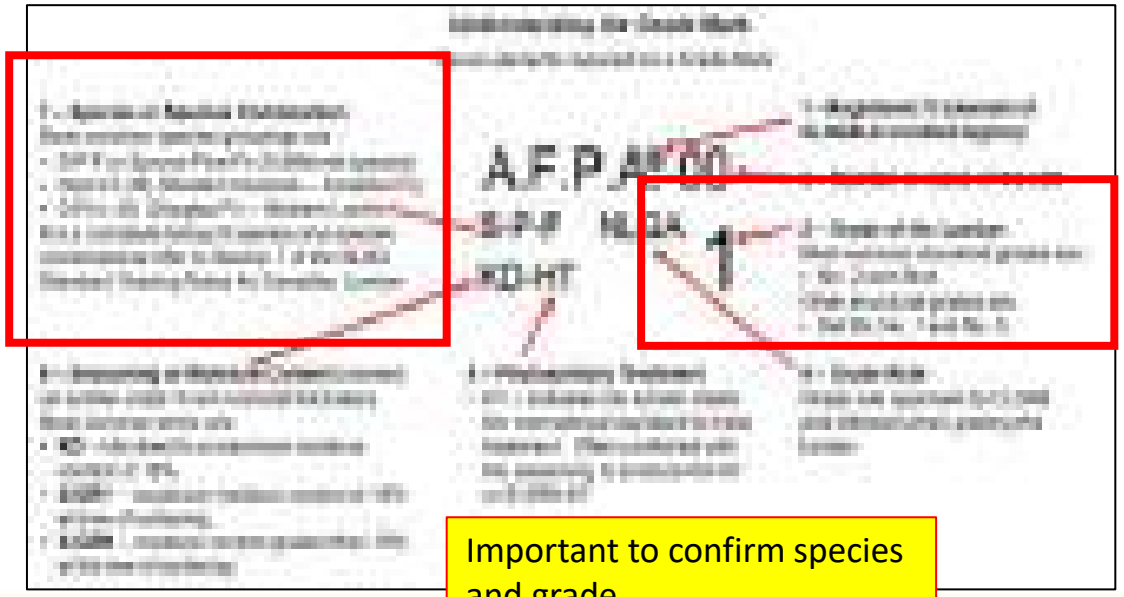
3) Except as provided in Sentence (4), reinforced concrete shall be designed to conform to the requirements of Part 4.



Design drawings should not have reinforcing details unless by an Engineer.

9.3 Materials, Systems and Equipment

- **9.3.2.2. Lumber Grades**
- Why a Grade Mark?
- The National Building Code of Canada and all Provincial Building Codes call for lumber to be grade stamped or certified, referencing standards approved by CLSAB. Enabling building inspectors to ensure that the product on site meets the specifications, design and/or engineering requirements.



Important to confirm species and grade

Canadian Lumber Standards Accreditation Board

Use of ungraded timber framing may trigger an engineer.

9.4 Structural Requirements

9.4.2.2 – Specific Snow Loads

- Whitehorse Specific snow load
- S = 1.9 kPa (40 psf)
  - S = (0.45 x 2.0) + 0.3 = 1.2 kPa

$$S = C_b S_s + S_r$$

where

S = specified snow load,

C_b = basic snow load roof factor, which is 0.45 where the entire width of the roof does not exceed 4.3 m and 0.55 for all other roofs,

S_s = 1-in-50-year ground snow load in kPa, determined according to Subsection 1.1.3., and

S_r = associated 1-in-50-year rain load in kPa, determined according to Subsection 1.1.3.

Table C-2
Climatic Design Data for Selected Locations in British Columbia
Forming Part of Appendix C

Province and Location	Elev., m	Design Temperature January 2.5% °C	January 1% °C	July 2.5% Dry °C	July 2.5% Wet °C	Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50 S_s	Snow Load, kPa, 1/50 S_r	Hourly Wind Pressures, kPa 1/10	Hourly Wind Pressures, kPa 1/50
British Columbia																
100 Mile House	[illegible]	-30	-32	29	17	5030	10	[illegible]	[illegible]	[illegible]	[illegible]	60	[illegible]	[illegible]	[illegible]	[illegible]
Abbotsford	70	-8	-10	29	20	2860	12	152	1525	1.6	1600	160	2.0	0.3	0.33	0.44
Agassiz	15	-9	-11	31	21	2750	8	[illegible]	1650	1.7	1700	160	2.4	0.1	0.35	0.47
Alberni	12	-5	-8	31	19	3100	10	144	1900	2.0	2000	220	2.6	0.4	0.24	0.32
Ashcroft	305	-24	-27	34	20	3700	10	[illegible]	[illegible]	[illegible]	300	80	1.7	0.1	0.29	0.38
[illegible]											2800	200	1.2	0.4	0.38	0.50
[illegible]											450	80	3.3	0.1	0.23	0.30
[illegible]											2800	350	2.6	0.6	0.40	0.50
[illegible]											1700	350	4.5	0.8	0.29	0.38

9.4 Structural Requirements

9.4.2.3 – Platforms Subject to Snow and Occupancy Loads

1) Balconies, decks and other accessible exterior platforms intended for an occupancy and subject to snow loads shall be designed to carry the specified roof snow load or 1.9kPa, which ever is greater, where the platform, or each segregated area of the platform, serves a single dwelling unit. (SeeNoteA-9.4.2.3.(1).

Note: Platforms subject to larger loads from built in planters or hot tubs will need to be designed by an Engineer.

Abbotsford Specific snow load

1.9 kPa (40 psf)

S = (0.45 x 2.0) + 0.3

= 1.2 kPa

1.9 kPa Controls

A-9.4.2.3.(1) Accessible Platforms Subject to Snow and Occupancy Loads. Many platforms are subject to both occupancy loads and snow loads. These include balconies, decks, verandas, flat roofs over garages and carports. Where such a platform, or a segregated area of such a platform, serves a single dwelling unit, it must be designed for the greater of either the specified snow load or an occupancy load of 1.9 kPa. Where the platform serves more than one single dwelling unit or an occupancy other than a residential occupancy, higher occupancy loads will apply as specified in Table 4.1.5.3.

9.4 Structure

Section 9.4.4. Foundation Conditions outlines the limitations of Part 9 design and allowable bearing pressures for different soil conditions.

9.4.4. **Foundation Conditions**

9.4.4.1. **Allowable Bearing Pressures**

1) [illegible]

Table 9.4.4.1.
Allowable Bearing Pressure for Soil or Rock
Forming Part of Sentence 9.4.4.1(1)

Type and Condition of Bearing Stratum	Maximum Allowable Bearing Pressure (kPa)
[illegible]	[illegible]

Notes to Table 9.4.4.1:
(1) See Note A-Table 9.4.4.1.

A-Table 9.4.4.1. Classification of Soils. Sand or gravel may be classified by means of a picket test in which a 38 mm by 38 mm picket beveled at the end at 45° to a point is pushed into the soil. Such material is classified as "dense or compact" if a man of average weight cannot push the picket more than 200 mm into the soil and "loose" if the picket penetrates 200 mm or more.

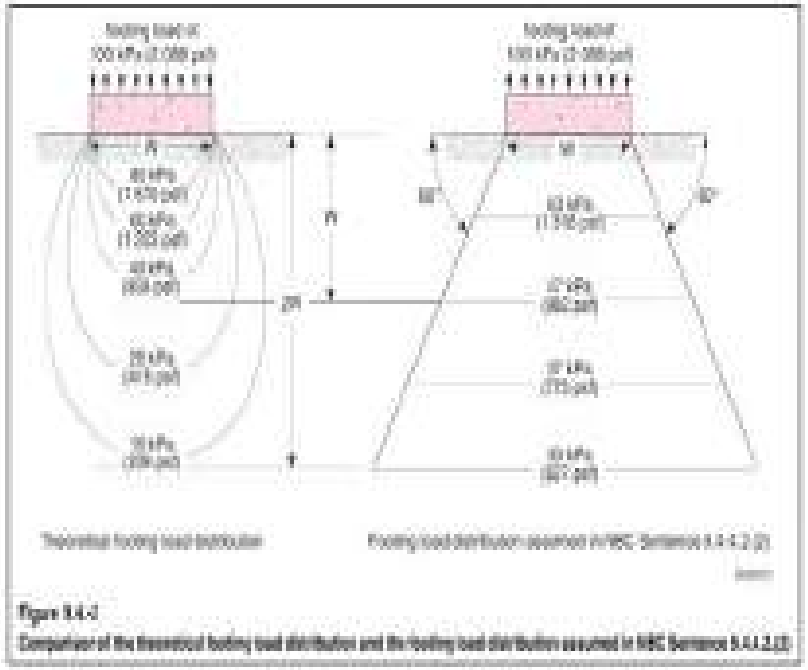
Clay and silt may be classified as "stiff" if it is difficult to indent by thumb pressure, "firm" if it can be indented by moderate thumb pressure, "soft" if it can be easily penetrated by thumb pressure, where this test is carried out on undisturbed soil in the wall of a test pit.

9.4 Structural Requirements

9.4.4.2. Foundation Capacity of Weaker Soil and Rock

1) Where a soil or rock within a distance equal to twice the footing width below the bearing surface has a lower allowable bearing pressure than that at the bearing surface as shown in Article 9.4.4.1., the design capacity of the foundation shall not be greater than would cause the weakest soil or rock to be stressed beyond its allowable bearing pressure.

2) In calculating subsurface pressures referred to in Sentence (1), the loads from the footings shall be assumed to be distributed uniformly over a horizontal plane within a frustum extending downward from the footing **at an angle of 60° to the horizontal**



9.4.4.3. High Water Table – 50% of Table 9.4.1.1.

9.4.4.4. Soil Movement

9.4 Structural Requirements

9.4.4.4. Soil Movement

This Article indicates that, where a foundation is located in an area where there is potential for soil movement due to changes in soil moisture content, freezing, or chemical-microbiological oxidation that could damage a building, measures must be taken to preclude the soil movement or to reduce its effect on the building so that the building will remain stable and its performance will not be adversely affected.

See NBC Note A-9.4.4.4.(1) for further information on soil movement.

- Expansion and Contraction due to Moisture
- Frost Heave
- Ice Lenses
- Adfreezing
- Pyrites

Ice lenses, two meters below ground April 11th 2024. clear looking lenses in the soil, most are lest than 1 mm thick. But if you get for than 25 of them in soild below a foundations, you will see a heave of over 25 mm (1 inch). This from an area where snow was undisturbed all winter long.

9.6 Glass in Guards

Glass guard rail systems have been very popular within residential construction for decades with the introduction of pre-manufactured aluminum rail and glass infill systems.

The use of topless rail systems has been increasing for a number of years and has led to questions on the structural integrity of the glass and rail components as well as impact resistance to objects both horizontally and vertically. Glass is a strong material but is very brittle and must be designed to meet structural loads and have redundancy of fail-safe load transfer. Failure of the glass can result in instantaneous collapse of the panel, resulting in no protection for a fall hazard.

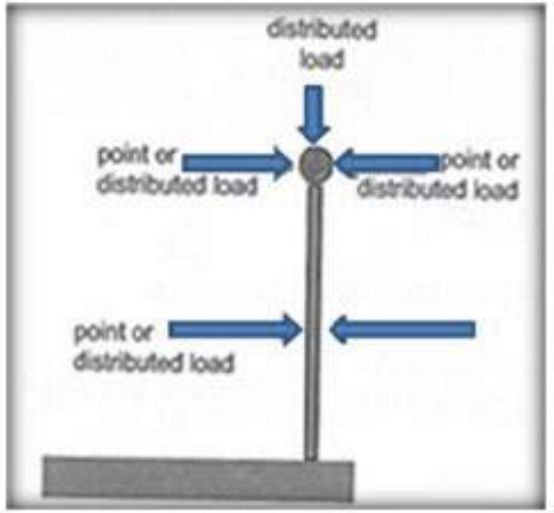
It has also been found that proprietary engineered glass railing systems have been modified on site without consult with the manufacturer or improperly installed/fastened.

Bulletin 22-05 Glass Guardrail.pdf

9.6 Glass in Guards

CAN/CGSB-12.20-M, Glass Guards and Balustrades. CAN/CGSB-12.20-M has additional structural requirements that need to be fulfilled in order to minimize the risk of progressive or localized collapse of structural glass panels with possible catastrophic consequences. Some of the glass failure modes that are being addressed by the requirements in CAN/CGSB-12.20 M are:

- Tempered glass fails instantaneously into many blunt pieces.
- Manufacturing of glass can include imperfections in the glass, which can expand and cause the glass to fail.
- Design and installation of framing brackets. Who is designing for the loads and ensuring proper installation in the field?



Load Diagram

Loads within the BC Building Code are expressed in kN or kN/m (kilo Newton metre) in simple terms this is a quantity very similar to 100 kg (220 lb) of pressure per metre length.
If for example it is stated that there is 1.0kN/m, it will be approximate the equivalent of one person weighing 100 kg (220 lb) putting their full weight on 1 m length.

9.6 Glass in Guards

This growing concern for both Part 3 and Part 9 buildings resulted in the development of EGBC: A Practice Guide for the Design of Guards in Buildings

This update to these guidelines was undertaken to reflect current industry standards and practices. In particular, a new Canadian standard was published in 2016, CSA A500 Building Guards (CSA 2016), which is a comprehensive standard on the design, testing, and implementation of Guards **and provides explicit guidance on the use of glass in Guards.**

There is BC Interpretation on this subject that takes a different point of view – can you source it?

Poll Questions

Poll Question #5

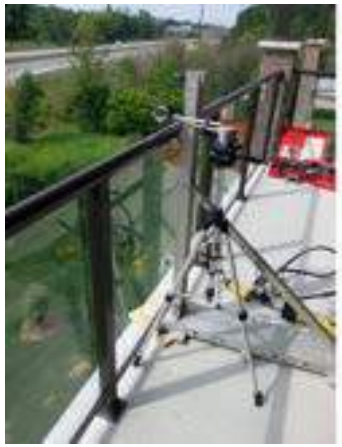
Does your LG require Engineering for topless glass guards?

- **Yes = 89%**
- **No = 3%**
- **Unsure = 6%**

136 Respondents

Perhaps a further review is required for consistency on structural loads on guards and some of the products typically being used – including glass for guards.

https://youtu.be/qFa3gD1tsA?si=3rQYEi43tsJraKDo



Guardrail Inspection Load test

9.8 Stairs, Ramps, Landings, Handrails and Guards

- **Heights of Guards – Members Question**

- Looking at the BCBC, IRC, etc, my inclination would be to ensure the required height would be measured from the seating surface.

- Part of this rationale is from the infinity pool requirement of maintaining a 5’ depth at the infinity line, as well as the bottom to seat of the hot tub is climbable.

Note – concentrated loads from hot tubs or built in planters require a design by registered professional.

Guards – Interpretation #1651

BCAB #1651 - Required Guards, Article 9.8.8.1., Height of Guard Adjacent to a Raised Hot Tub

Last updated on March 24, 2016

September 17, 2008

BCAB #1651

Re: Required Guards, Article 9.8.8.1., Height of Guard Adjacent to a Raised Hot Tub

Project Description

The subject is an exterior balcony with a guard constructed around its exterior perimeter. Prior to the placement of a hot tub on the balcony, the balcony guard construction is Code compliant with a height of 1070 mm.

A hot tub has been placed in an exterior corner of the deck about 600 mm from the edges and guard of the deck. The height of the outer edge of the hot tub is about 1000 mm above the deck's floor surface. There are provisions for seating around outer edge of the tub. When not in use, the tub is provided with a rigid cover.

Reason for Appeal

Sentence 9.8.8.1.(1) requires every surface to which access is provided for other than maintenance purposes shall be protected by a guard on each side that is not protected by a wall for the length.

Appellant's Position

The appellant considers it unrealistic to have a guard of 1070 mm above the top surface of the hot tub's outer edge.

Building Official's Position

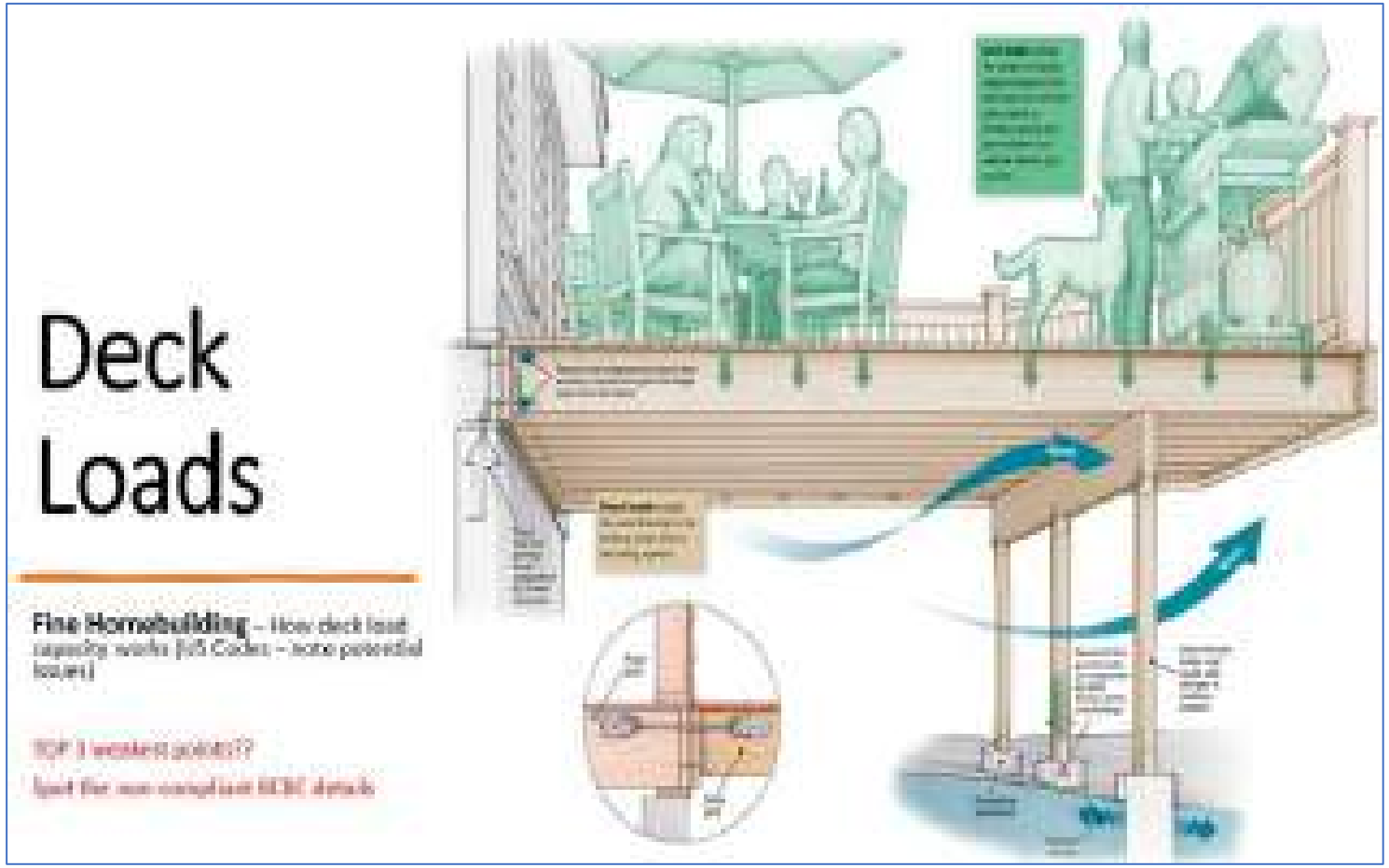
The Building Official contends that due to hot tub's proximity to the balcony guard and the height of the hot tub outer edge with respect to the height of the balcony guard, that a slip or fall that may occur in or on the tub, would render the existing balcony guard ineffective. The Building Official is requesting the guard be at least 1070 mm above the top surface of the tub's outer edge.

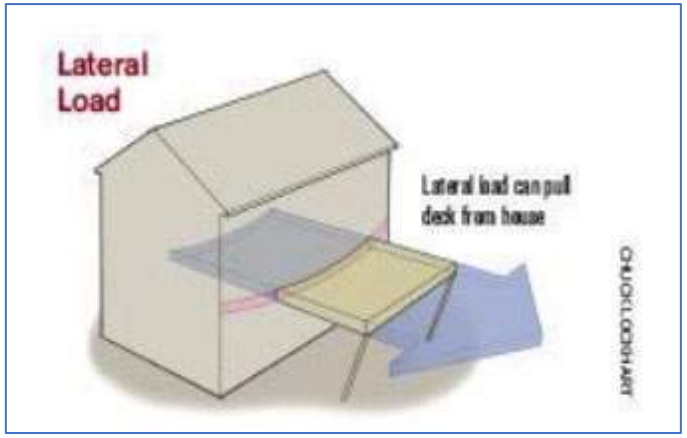
Guards – Interpretation #1651

Appeal Board Decision #1651

The Board acknowledges that in this specific case, the Building Official's concerns "that a slip or fall that may occur in or on the tub, would render the existing balcony guard ineffective". However it is the determination of the Board that Sentence 9.8.8.1.(1) does not require this deck guard to be 1070 mm above the top surface of the hot

Reminder - Loads on Decks



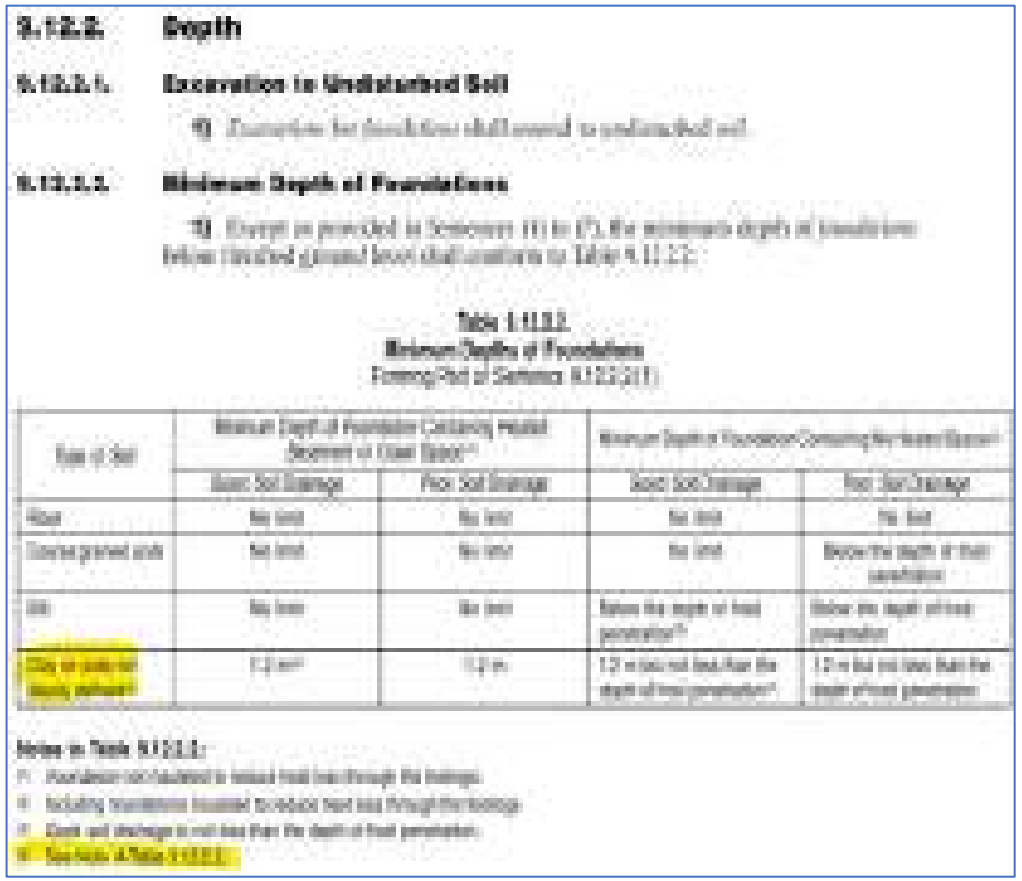


Images from Fine Homebuilding magazine.

Lateral load failures most common with inadequate ledger attachments to building.

Improper selection of hangers and fasteners are a common inspection deficiency.

9.12.2.Excavations and Frost Depths.



9.12.2. Depth

9.12.2.1. Excavation in Undisturbed Soil

1) Excavation for foundations shall extend to undisturbed soil.

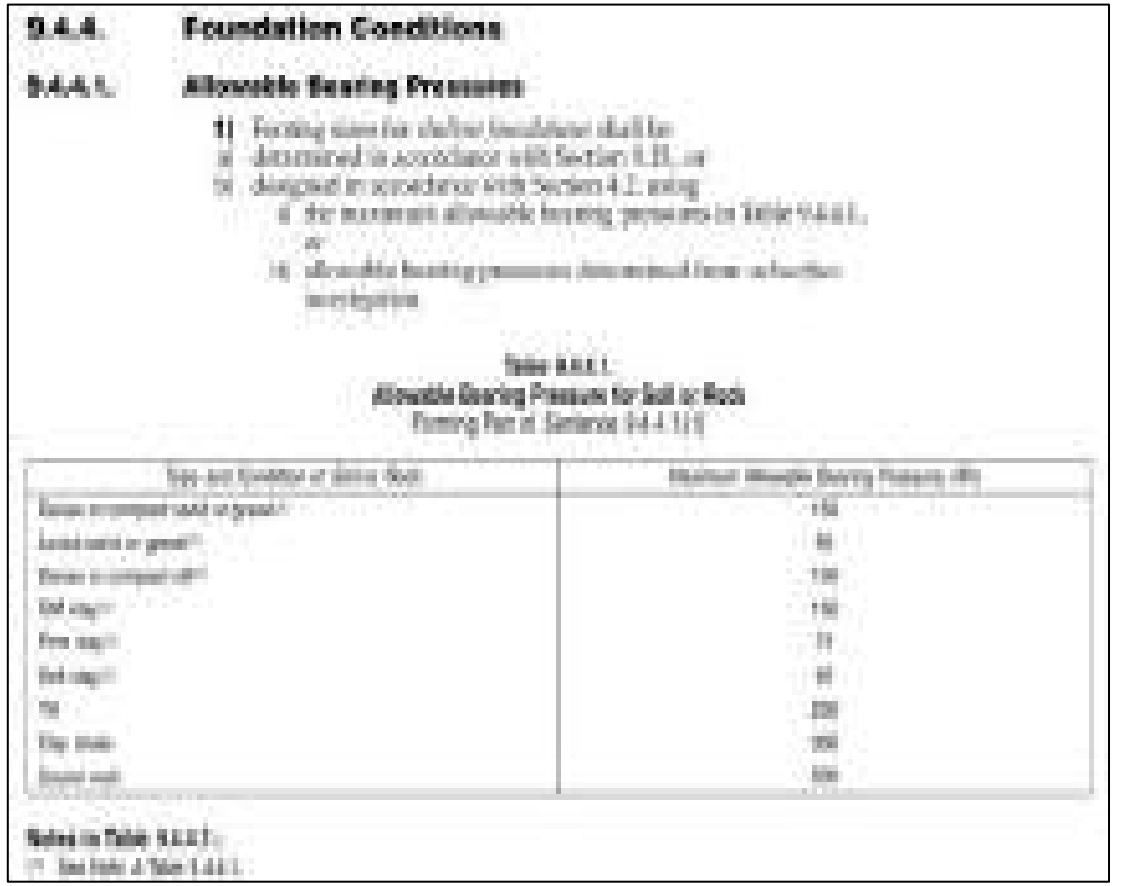
9.12.2.2. Minimum Depth of Foundations

1) Except as provided in Sentences (4) to (7), the minimum depth of foundations below finished ground level shall conform to Table 9.12.2.2.

Table 9.12.2.2.
Minimum Depths of Foundations
Forming Part of Sentence 9.12.2.2(1)

Type of Soil	Minimum Depth of Foundation Containing Heated Basement or Crawl Space[1]		Minimum Depth of Foundation Containing Non-heated Space[1]	
	Good Soil Drainage	Poor Soil Drainage	Good Soil Drainage	Poor Soil Drainage
Rock	No limit	No limit	No limit	No limit
Coarse grained soils	No limit	No limit	No limit	Below the depth of frost penetration
Silt	No limit	No limit	Below the depth of frost penetration[2]	Below the depth of frost penetration
Clay or soils not listed above	1.2 m[3]	1.2 m	1.2 m but not less than the depth of frost penetration[2]	1.2 m but not less than the depth of frost penetration

Notes to Table 9.12.2.2.:
1) Foundation not insulated to reduce heat loss through the footings.
2) Including foundations insulated to reduce heat loss through the footings.
3) Clear soil drainage is not less than the depth of frost penetration.
4) See Note A-Table 9.12.2.2.



9.4.4. Foundation Conditions

9.4.4.1. Allowable Bearing Pressures

1) Footing sizes for shallow foundations shall be
   a) determined in accordance with Section 4.2., or
   b) designed in accordance with Section 4.2. using
      i) the minimum allowable bearing pressures in Table 9.4.4.1., or
      ii) allowable bearing pressures determined from an acceptable investigation.

Table 9.4.4.1.
Allowable Bearing Pressure for Soil or Rock
Forming Part of Sentence 9.4.4.1.(1)

Type and Condition of Soil or Rock	Minimum Allowable Bearing Pressure (kPa)
Rock	1 MPa
Gravel or compact sand	150
Loose sand or gravel[1]	75
Firm clay[1]	100
Stiff clay[1]	150
Very stiff clay[1]	200
Hard clay[1]	300
Till	300
Clay shale	300
Ground snow	50

Notes to Table 9.4.4.1.:
1) See Note A-Table 9.4.4.1.

Frost depths range from 450mm to 2.5m in BC

Frost Depths.

[Freezing Degree Days | Canada | Climate Atlas of Canada]

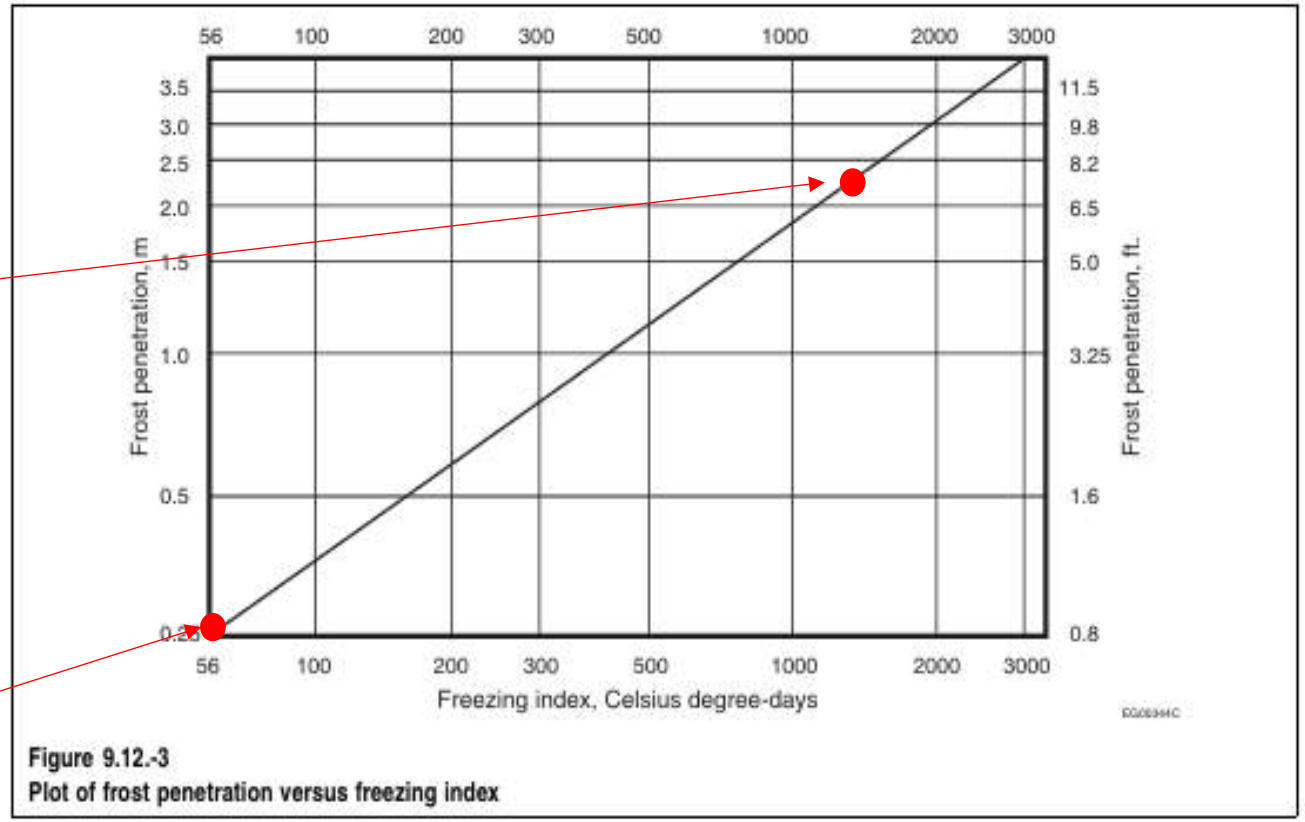


Figure 9.12.-3
Plot of frost penetration versus freezing index

Frost depths range from 450mm to 2.5m in BC

9.12 Excavations - Frost

Notice the frost lift on this porch roof – the bottom stair used to be on the concrete.

This creates 03 significant issues:

- Deck sloping towards house,
- Deck stair risers exceed max at landing,
- Continued cycling of over seasons can lead to building envelope failure and eventually structural failure.
    - It could be a factor in ledger failures.

A-9.15.1.1. Application of Footing and Foundation Requirements to Decks and Similar Constructions. Because decks, balconies, verandas and similar platforms support occupancies, they are, by definition, considered as buildings or parts of buildings. Consequently, the requirements in Section 9.15. regarding footings and foundations apply to these constructions.

Nov-24

Jan - 25

9.12 Frost Depth - Exemptions

9.12.2.2. Minimum Depth of Foundations

7) The foundation depths required by Sentence (1) do not apply to foundations for decks and other accessible exterior platforms

a) of not more than 1 storey,

b) not more than 55 m2 in area,

c) where the distance from finished ground to **the underside of the joists is** not more than 600 mm,

d) not supporting a roof, and

e) not attached to another structure, unless it can be demonstrated that differential movement will not adversely affect the performance of that structure.

8) Where decks or other accessible exterior platforms are supported on surface foundations supported on other than coarse-grained soil with good drainage or rock, access to the foundation positions to permit re-levelling of the platform shall be provided

a) by passageways with a clear height under the platform of not less than 600 mm and a width of not less than 600 mm, or

b) by installing the decking in a manner that allows easy removal.

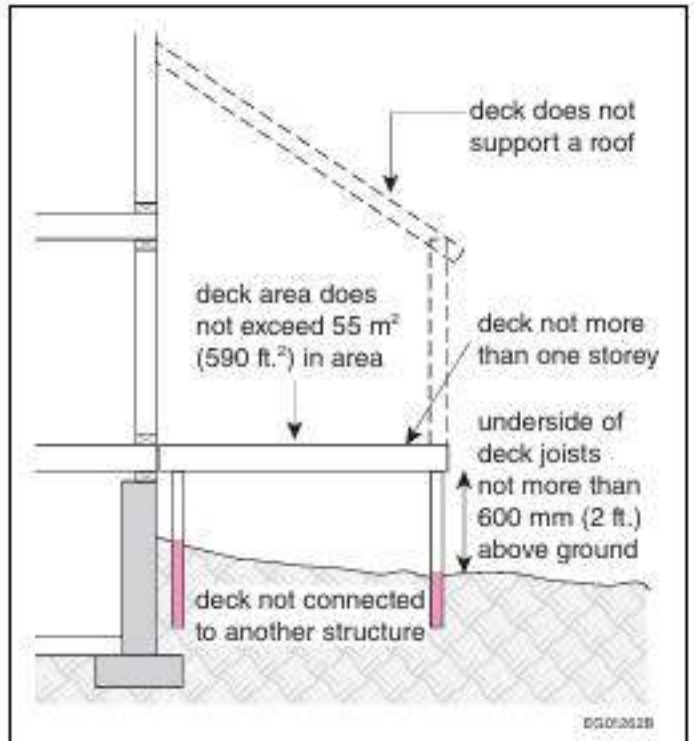


Figure 9.12.-6
Conditions for reduced foundation depth for decks

9.15 Footings and Foundations

9.15.1.1. General

(See Notes A-9.15.1.1. and A-9.4.4.6. and 9.15.1.1.)

1) Except as provided in Articles 9.15.1.2. and 9.15.1.3., this Section applies to

a) concrete or unit masonry foundation walls and concrete footings not subject to surcharge

i) on stable soils with an allowable bearing pressure **of 75 kPa or greater, a**nd

ii) for buildings of wood-frame or masonry construction,

Is 75 kPa the bearing capacity used for footing Tables??

9.15 Footings and Foundations

A-9.15.1.1. Application of Footing and Foundation
Requirements to Decks and Similar Constructions. Because decks, balconies, verandas and similar platforms support occupancies, they are, **by definition, considered as buildings** or parts of buildings.

Consequently, the requirements in Section 9.15. regarding footings and foundations apply to these constructions.

Building means any structure used or intended for supporting or sheltering any use or occupancy.

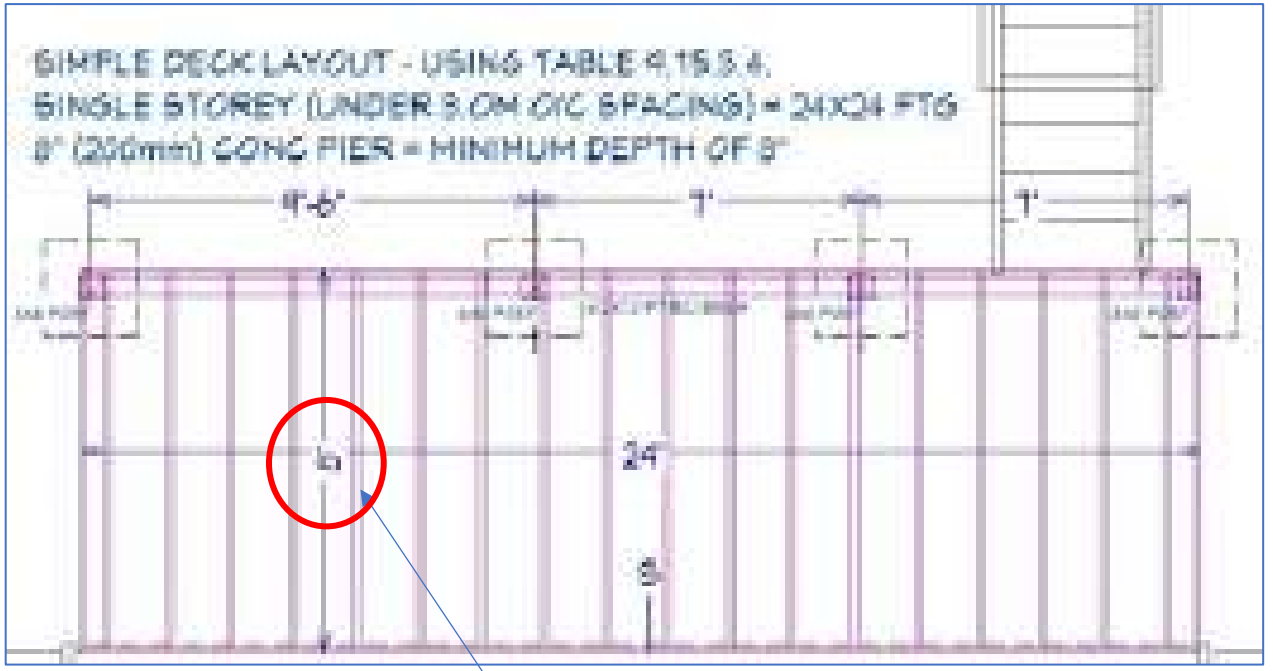
9.15 Footings and Foundations

Table 9.15.3.4.
Minimum Footing Sizes
Forming Part of Sentence 9.15.3.4.(1)

No. of Floors Supported	Minimum Width of Strip Footings, mm		Minimum Footing Area for Columns Spaced 3 m o.c.,(1) m²
	Supporting Exterior Walls(2)	Supporting Interior Walls(3)	
1	250	200	0.4
2	350	350	0.75
3	450	500	1.0

Notes to Table 9.15.3.4.:
(1) See Sentence 9.15.3.7.(1).
(2) See Sentence 9.15.3.5.(1).
(3) See Sentence 9.15.3.6.(1).

9.15.3.7. Adjustments to Footing Area for Columns
1) The footing area for column spacings other than shown in Table 9.15.3.4. shall be adjusted in proportion to the distance between columns.



How far can the joist span under Part 9?
4.9m (ft) – 9.15.3.3.1.(b)

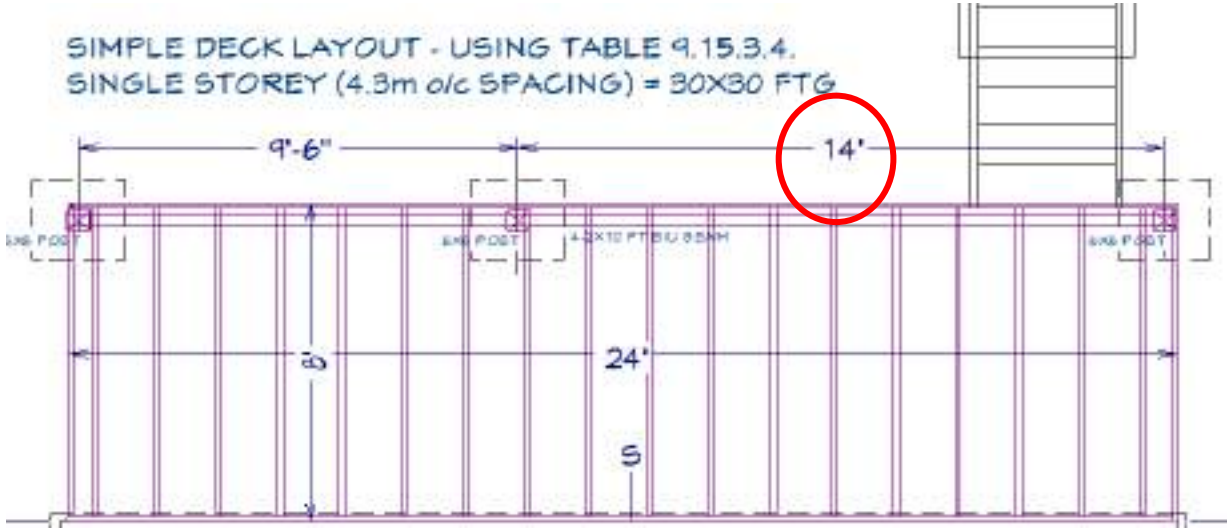
9.15 Footings and Foundations

Table 9.15.3.4.
Minimum Footing Sizes
Forming Part of Sentence 9.15.3.4.(1)

No. of Floors Supported	Minimum Width of Strip Footings, mm		Minimum Footing Area for Columns Spaced 3 m o.c.,(1) m²
	Supporting Exterior Walls(2)	Supporting Interior Walls(3)	
1	250	200	0.4
2	350	350	0.75
3	450	500	1.0

Notes to Table 9.15.3.4.:
(1) See Sentence 9.15.3.7.(1).
(2) See Sentence 9.15.3.5.(1).
(3) See Sentence 9.15.3.6.(1).

9.15.3.7. Adjustments to Footing Area for Columns
1) The footing area for column spacings other than shown in Table 9.15.3.4. shall be adjusted in proportion to the distance between columns.



What would be the footing size if footing spacing was 14’ (4.3m) – 4.3/3m = 1.43 x 0.4 sqm = 0.57 sqm (6.1 sqft) (878 sqin)
30”x 30” = 900 sqin
However note limitations of 9.15.2.3 Pier Type Foundations

9.15.2.3. Pier Type Foundations

When referring to Article 9.15.2.3. there is a limit of column/post spacing as well as the number of deck levels. *see 2020 – Part 9 Illustrated Guide as it also includes wording on decks.

9.15.2.3. Pier-Type Foundations

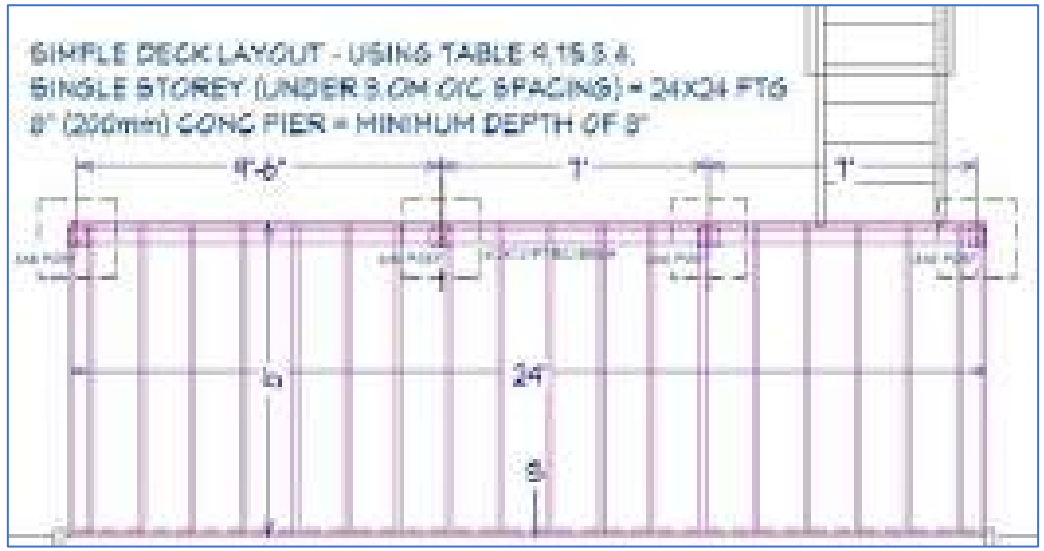
1) Where pier-type foundations are used, the piers shall be designed to support the applied loads from the superstructure.
2) **Where piers are used as a foundation system in a building of 1 storey in building height, the piers shall be installed to support the principal framing members and shall be spaced not more than 3.5 m apart along the framing, unless the piers and their footings are designed for larger spacings.**
3) **The height of piers described in Sentence (2) shall not exceed 3 times their least dimension at the base of the pier.**
4) Where concrete block is used for piers described in Sentence (2), they shall be laid with cores placed vertically, and where the width of the building is 4.3 m or less, placed with their longest dimension at right angles to the longest dimension of the building (typical with Z240 MH or single level A277 buildings)

9.15.2.3. Pier Type Foundations

Therefore, in the application of a typical deck footing design made up of a concrete pier on footing supporting a wood column (above grade), we would be limited to:

- 1 storey in building height, the piers shall be installed to support the principal framing members and shall be spaced not more than 3.5 m apart along the framing,
  - unless the piers and their footings are designed for larger spacings. (Engineered design)
    - We could look to Table 9.15.3.4. - for increased spacing for footing but not for piers as there appears no Part 9 prescriptive method.

9.15 Footings and Foundations



9.15.3.8. Footing Thickness

1) Footing thickness shall be not less than the greater of

a) 100 mm, or

b) the width of the projection of the footing beyond the supported element.

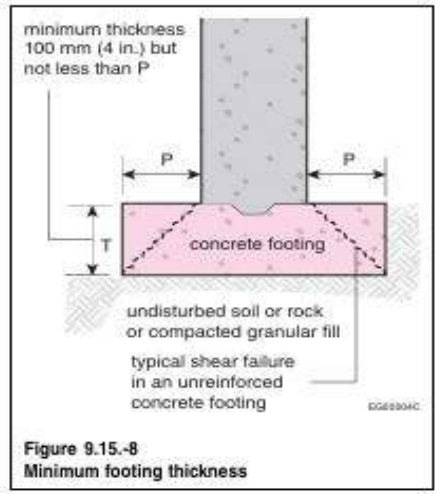


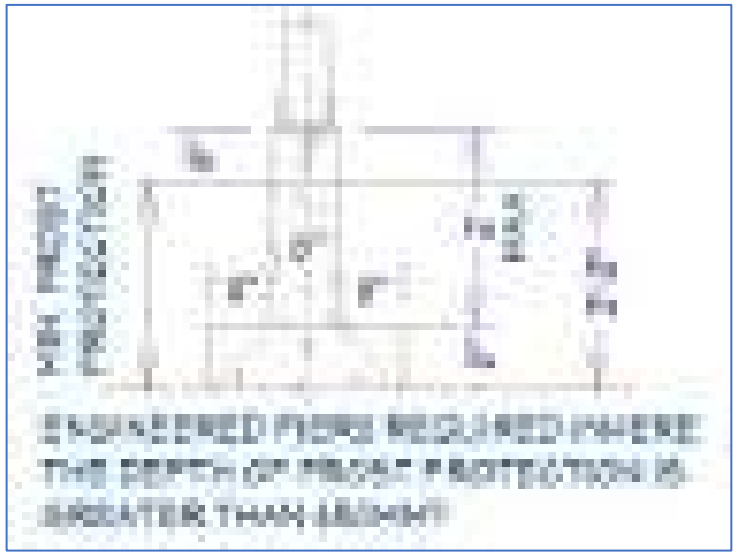
Figure 9.15.-8
Minimum footing thickness

9.15.2.3. Pier Type Foundations

In the application of a typical deck footing design (24”x24”) made up of a concrete pier on footing supporting a wood column (above grade), we would require a footing depth of 8” (200mm).

And

The height of piers shall not exceed 3 times their least dimension at the base of the pier.



Footings Alternatives

Screw-piles are becoming more popular in Alberta (NBC - Alberta) and BC.

Would this help with issues related to frost protection?

Geotechnical Engineering is required

Structural for concrete grade beams?

Still needs to go beyond frost level.

9.17 Columns

9.17.1. Scope

9.17.1.1. Application

1) This Section applies to columns used to support

a) beams carrying loads from not more than 2 wood-frame floors where
   i) the supported length of joists bearing on such beams does not exceed 5 m, and
   ii) the live load on any floor does not exceed 2.4 kPa (see Table 4.1.5.3.),

b) beams or header joists carrying loads from not more than 2 levels of wood-frame balconies, decks or other accessible exterior platforms, or 1 level plus the roof, where
   i) the supported length of joists bearing on such beams or joists does not exceed 5 m,
   ii) the sum of the specified snow and occupancy loads does not exceed 4.8 kPa (see Sentence 9.4.2.3.(1) for the determination of load on platform-type constructions), and
   iii) the platform serves only a single suite of residential occupancy, or

c) carport roofs (see Section 9.35.).

2) Columns for applications other than as described in Sentence (1) shall be designed in accordance with Part 4.

9.17.2. General

9.17.2.1. Location

1) Columns shall be centrally located on a footing conforming to Section 9.15.

Columns transfer beam loads down to solid bearing. In basements, columns carry the load directly to the footings, which distribute the concentrated loads over a wider area. The beam loads depend on the type of occupancy, the size of the supported floor or roof assembly, and the number of floors that are carried by the beams.

Illustrated Users Guide – NBC 2020.

9.17 Columns

9.17.1. Scope

9.17.1.1. Application

1) This Section applies to columns used to support
a) beams carrying loads from not more than 2 wood-frame floors where
   i) the supported length of joists bearing on such beams does not exceed 5 m, and
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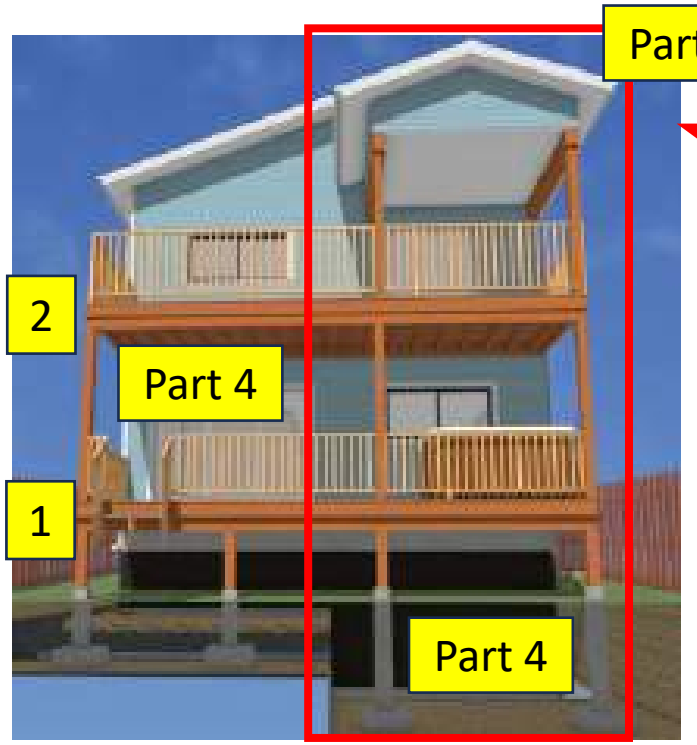
b) beams or header joists carrying loads from not more than 2 levels of wood-frame balconies, decks or other accessible exterior platforms, or 1 level plus the roof, where
   i) the supported length of joists bearing on such beams or joists does not exceed 5 m,
   ii) the sum of the specified snow and occupancy loads does not exceed 4.8 kPa (see Sentence 9.4.2.3.(1) for the determination of load on platform-type constructions), and
   iii) the platform serves only a single *suite* of *residential occupancy*, or
c) carport roofs (see Section 9.35.).

2) Columns for applications other than as described in Sentence (1) shall be designed in accordance with Part 4.

9.17.2. General

9.17.2.1. Location

1) Columns shall be centrally located on a footing conforming to Section 9.15.



Can this - two deck and roof be designed to Part 9?

This sentence refers to levels while 9.15.3.2.(1) refers to storey.

9.17 Columns

9.17.2.2. Lateral Support

1) Columns shall be securely fastened to the supported member to reduce the likelihood of lateral differential movement between the column and the supported member. (See also Article 9.23.6.2.)

2) Except as permitted by Sentence (3), columns shall be laterally supported to resist racking

a) directly, or

b) by connection to the supported members.

(See Note A-9.17.2.2.(2).)

3) Columns need not be provided with lateral support as described in Sentence (2), where

a) the distance from finished ground to the underside of the joists is not more than 600 mm, and

b) the columns support a deck with no superstructure.

Because the NBC does not provide prescriptive criteria to describe the minimum required lateral support, constructions are limited to those that have demonstrated effective performance over time and those that are designed according to NBC Part 4. Verandas on early 20th century homes provide one example of constructions whose floor and roof are typically tied to the rest of the building to provide effective lateral support. Large decks set on tall columns, however, are likely to require additional lateral support even where they are connected to a building on one side.

Illustrated Users Guide – NBC 2020.

9.17.4. Wood Columns

9.17.4.1. Column Sizes

1) The width or diameter of a wood column shall be not less than the width of the supported member.

2) Except as provided in Article 9.35.4.2., columns shall be not less than 184 mm for round columns and 140 mm by 140 mm for rectangular columns, unless calculations are provided to show that lesser sizes are adequate.

9.17.4.2. Materials

1) Wood columns shall be either solid, glued-laminated or built-up.

2) Built-up columns shall consist of not less than 38 mm thick full-length members
a) bolted together with not less than 9.52 mm diam bolts spaced not more than 450 mm o.c., or
b) nailed together with not less than 76 mm nails spaced not more than 300 mm o.c.

3) Glued-laminated columns shall conform to Section 4.3.

9.17.4.3. Columns in Contact with Concrete

1) Wood columns shall be separated from concrete in contact with the ground by 0.05 mm polyethylene film or Type S roll roofing.

9.17.6. Solid Concrete Columns

9.17.6.1. Materials

1) Concrete shall conform to Section 9.3.

9.17.6.2. Sizes

1) Concrete columns shall be not less than 300 mm by 300 mm for rectangular columns and 300 mm diam for circular columns.

Deck wood columns typically bear on ftg/pier so review 9.15.3.2. Pier foundations. KK

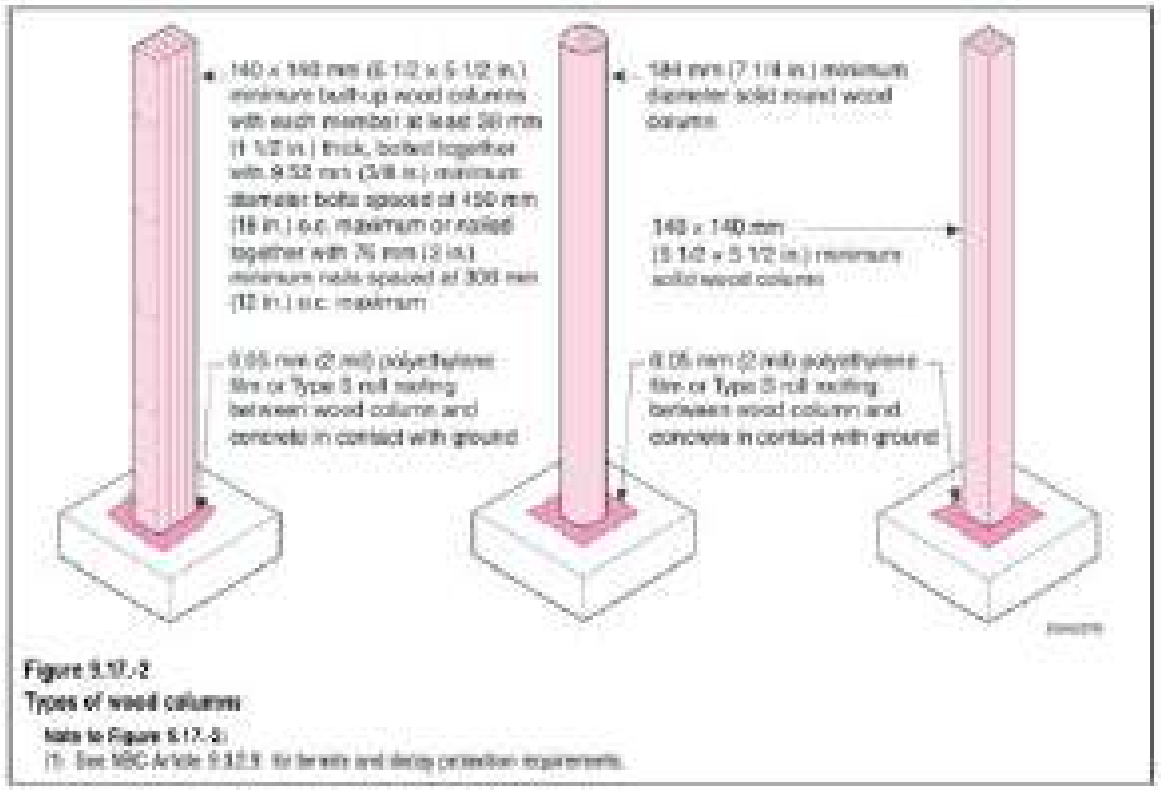


Figure 9.17.2
Types of wood columns
Note to Figure 9.17.2:
(1) See NBC Article 9.17.3. for termite and decay protection requirements.

When a wood column is subjected to a vertical load, its resistance to buckling will depend on its slenderness ratio (the length divided by the least dimension).The larger the slenderness ratio, the greater the tendency to buckle. Therefore, if a column is built up with a series of wooden members, it will not be as strong as a one-piece column of the same cross-section, unless the individual pieces are joined to act in unison. Figure 9.17.2 show nails or bolts may be used to connect individual laminations together.

Notes and Figures from Illustrated Users Guide – NBC 2020.

Poll Questions

Poll Question #7

Is there a code limit for the maximum vertical height of a wood deck post?

- **Yes = 64%**
- **No = 21%**
- **Unsure = 13%**

129 Responses

Where is the height limit found for exterior (wood) columns in the Part 9?

9.23 Wood Frame Construction

9.23.2.4. Connections to Preservative-Treated Wood

1) Except as provided in Sentence (3), connectors in contact with preservative-treated wood shall be made of

a) hot-dipped, zinc-coated galvanized steel with a coating weight not less than Z550 conforming to ASTM A653/A653M, "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process,"

b) a material that provides an equivalent level of corrosion protection to that provided by the material described in Clause (a), or

c) stainless steel.

2) Fasteners used to attach the connectors referred to in Sentence (1) shall be made of

a) galvanized steel coated with zinc in accordance with ASTM A153/A153M, "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware," or

b) a material that provides an equivalent level of performance and is compatible with the connector.

3) Connectors and fasteners that are in contact with wood that has been treated with a disodium octaborate tetrahydrate (SBX (DOT)) or zinc borate preservative and is installed in a dry interior environment are permitted to be made of uncoated carbon steel. (See Note A-9.23.2.4.(3).)

9.23 Wood Frame Construction

9.23.3.1.Standards for Nails and Screws

1) Except as provided in Sentence (2) and unless otherwise indicated, nails specified in this Section shall be **common steel wire nails or common spiral nails** conforming to

a) ASTM F1667, “Standard Specification for Driven Fasteners: Nails, Spikes, and Staples,” or

b) b) CSA B111, “Wire Nails, Spikes and Staples.”

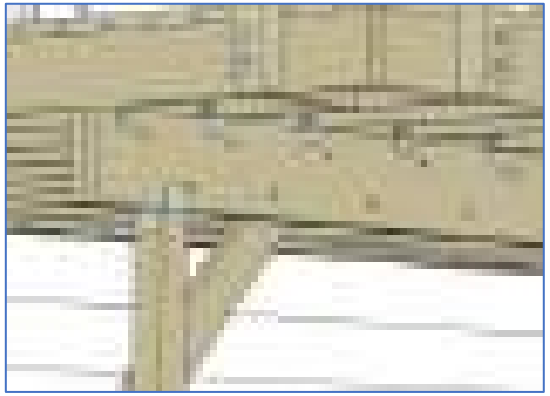
2) **Nails** used to comply with Table 9.23.3.4. shall have a diameter not less than that stated in Table 9.23.3.1. (See Note A-9.23.3.1.(2).)

3) **Wood screws** specified in this Section shall conform to ASME B18.6.1, “Wood Screws (Inch Series).” (See Note A-9.23.3.1.(3).)

The use of Screws are only outlined for sheathing and sub-flooring.
In 9.23.8.3.(7) (8)– only nails or bolts are shown for fastening built up beams.

Table 9.23.3.1.
Diameter of Nails
Forming Part of Sentence 9.23.3.1.(2)

Minimum Length of Nails, mm	Minimum Diameter of Nails, mm
57	2.87
63	3.25
76	3.66
82	3.66
101 or greater	4.88



Is the use of these priority connectors that are not listed in the Code now standard application?

9.23 Wood Frame Construction

9.23.3.1.Standards for Nails and Screws

1) Except as provided in Sentence (2) and unless otherwise indicated, nails specified in this Section shall be **common steel wire nails or common spiral nails** conforming to

a) ASTM F1667, “Standard Specification for Driven Fasteners: Nails, Spikes, and Staples,” or

b) b) CSA B111, “Wire Nails, Spikes and Staples.”

2) **Nails** used to comply with Table 9.23.3.4. shall have a diameter not less than that stated in Table 9.23.3.1. (See Note A-9.23.3.1.(2).)

3) **Wood screws** specified in this Section shall conform to ASME B18.6.1, “Wood Screws (Inch Series).” (See Note A-9.23.3.1.(3).)

Several connection points in a deck design.

What is typically done for (non-engineered) designs?

Poll Questions

Poll Question #8

Is there a prescriptive code outline for deck ledger boards.

- **Yes = 17%**
- **No = 65%**
- **Unsure = 15%**

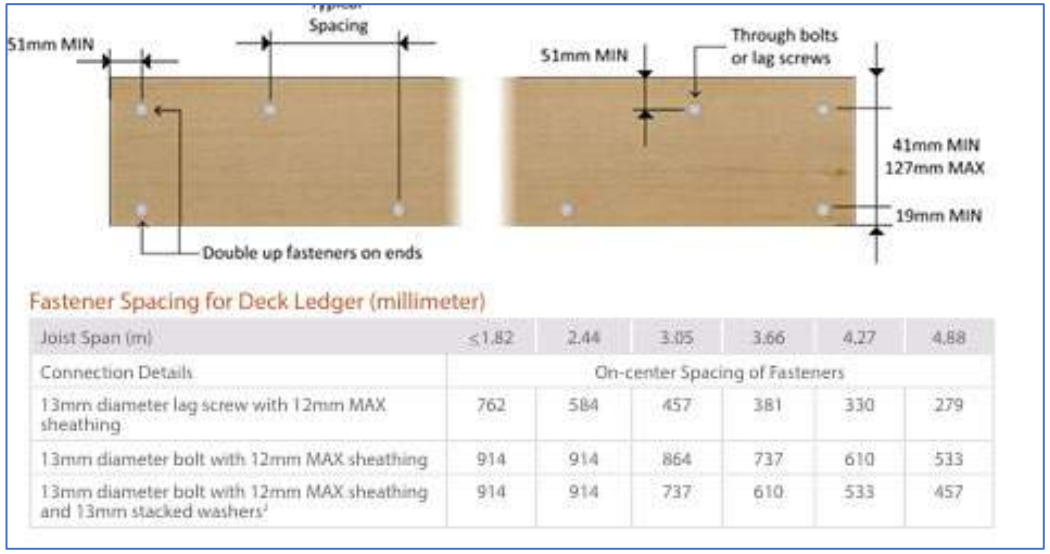
137 Responses

Session chat comment - ledger in lieu of joist hangers is in the code, just the gravity loads. Ledgers for gravity and pull-out loads not prescribed.
Note – the Code does reference "ledgers", however it does not give specifics for attachment design. KK

9.23 Wood Frame Construction

If a ledger attachment is used, an adequate water management strategy must be developed to reduce the potential for periods of extended wetting as poor detailing at the ledger connection is a common cause of failure in this deck/balcony type. While BCBC does not provide comprehensive guidance on ledger fastening patterns, *Section R507.2*[5] of the International Residential Code (IRC), the model building code adopted throughout most of the United States, has requirements for both fastener selection and placement.

Best practices dictates that lag bolts or through bolts with washers be used to secure the ledger to the appropriate backing within the building structure. Fasteners should be 13mm (0.5") in diameter and must fully penetrate through the ledger and rim joist. A gap of 13mm (0.5") is structurally allowable between the ledger and wall and is recommended for open decks to provide space for drainage and drying to occur. In order to ensure a robust connection to the building and sufficient support for the deck structure, fasteners should be installed in a staggered fashion at a spacing corresponding to the joist span. The table and corresponding figure below provide guidance on fastener spacing and placement at the ledger.



Fastener Spacing for Deck Ledger (millimeter)

Joist Span (m)	≤1.82	2.44	3.05	3.66	4.27	4.88
Connection Details	On-center Spacing of Fasteners					
13mm diameter lag screw with 12mm MAX sheathing	762	584	457	381	330	279
13mm diameter bolt with 12mm MAX sheathing	914	914	864	737	610	533
13mm diameter bolt with 12mm MAX sheathing and 13mm stacked washers[3]	914	914	737	610	533	457

[Illustrated Guide - Building Safe and Durable Wood Decks and Balconies]

Does it matter what rim joist material it is attaching to??

9.23 Wood Frame Construction

Framing without an Engineer

9.23.4. Maximum Spans

9.23.4.1. Application

1) Spans provided in this Subsection for joists, beams and lintels supporting floors shall apply only where

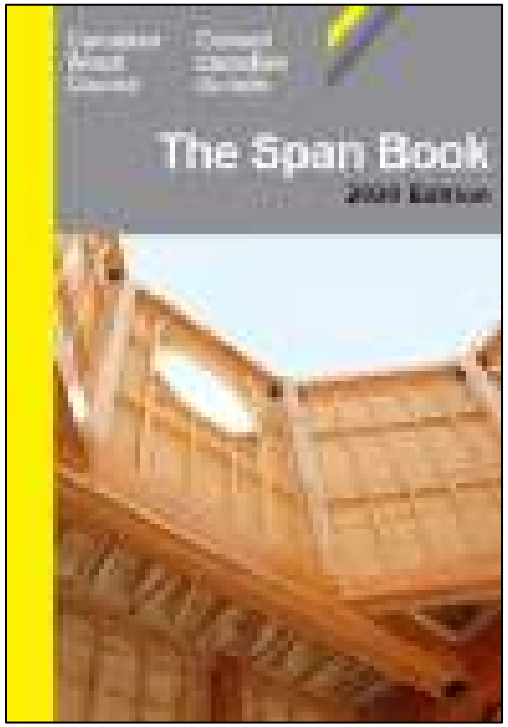
a) the floors serve residential areas as described in Table 4.1.5.3., or

b) the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.

2) Spans for joists, beams and lintels supporting floors shall be determined according to Subsection 4.1.3. where the supported floors

a) serve other than residential areas, or

b) support a uniform *live load* in excess of that specified for residential areas.



9.23 Wood Frame Construction

9.23.4.2. Spans for Joists, Rafters and Beams

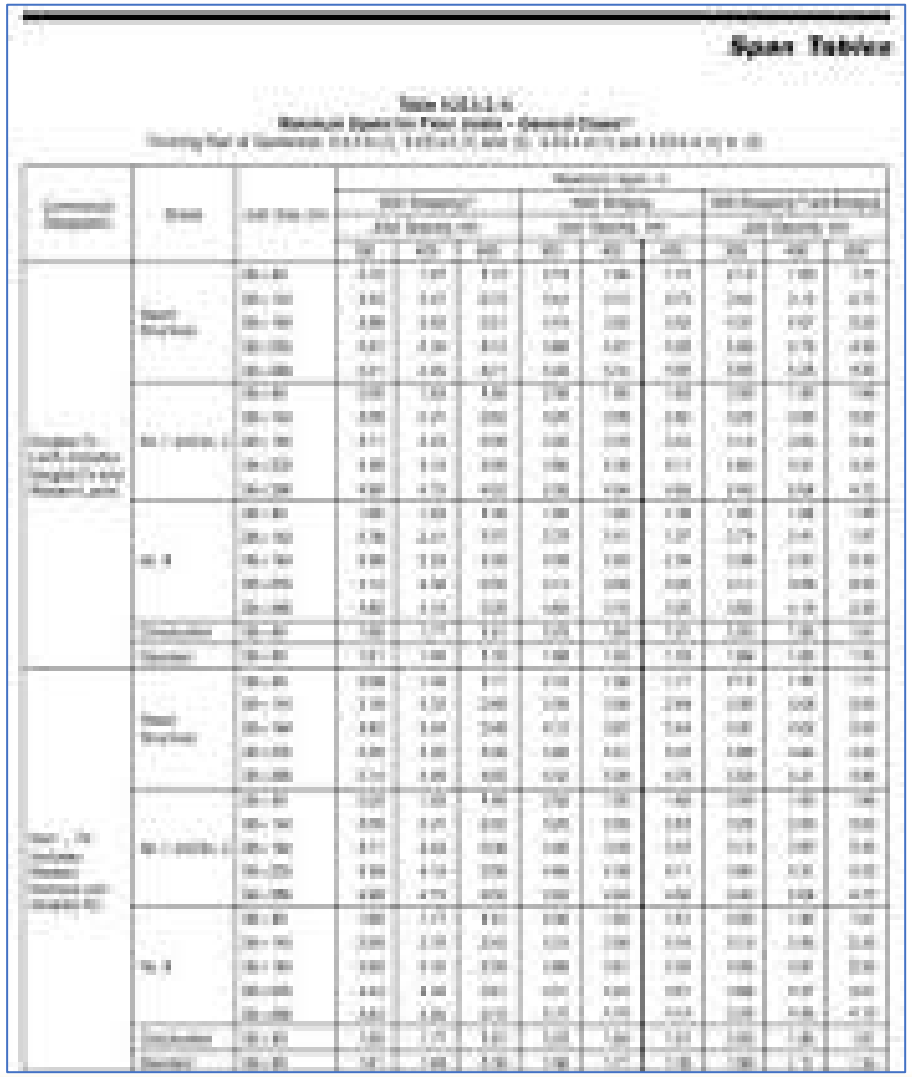
(See Note A-9.23.4.2.)

1) Except as required in Sentence (2) and Article 9.23.14.10., spans for wood joists and rafters shall conform to the spans shown in Span Tables 9.23.4.2.-A to 9.23.4.2.-G for the uniform *live loads* shown in the Tables. (See Article 9.4.2.2.)

2) Spans for floor joists that are not selected from Span Tables 9.23.4.2.-A and 9.23.4.2.-B and that are required to be designed for the same loading conditions, shall not exceed the design requirements for uniform loading and vibration criteria. (See Note A-9.23.4.2.(2).)

3) Spans for built-up wood and glued-laminated timber floor beams shall conform to the spans in Span Tables 9.23.4.2.-H to 9.23.4.2.-K. (See Article 9.4.2.2.)

4) Spans for roof ridge beams shall conform to the spans in Span Table 9.23.4.2.-L for the uniform snow load shown. (See Articles 9.4.2.2. and 9.23.14.8.)


Span Tables

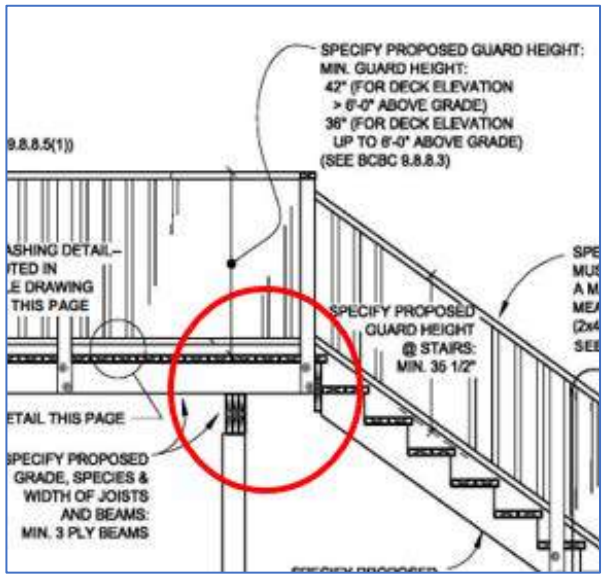
9.23 Wood Frame Construction

9.23.9.9. Cantilevered Floor Joists

1) Floor joists supporting roof loads shall not be cantilevered more than 400 mm beyond their supports where 38 mm by 184 mm joists are used and not more than 600 mm beyond their supports where 38 mm by 235 mm or larger joists are used.

2) The cantilevered portions referred to in Sentence (1) shall not support floor loads from other *storeys* unless calculations are provided to show that the design resistances of the cantilevered joists are not exceeded.

3) Where cantilevered floor joists described in Sentences (1) and (2) are at right angles to the main floor joists, the tail joists in the cantilevered portion shall extend inward away from the cantilever support a distance equal to not less than 6 times the length of the cantilever, and shall be end nailed to an interior doubled header joist in conformance with Table 9.23.3.4.

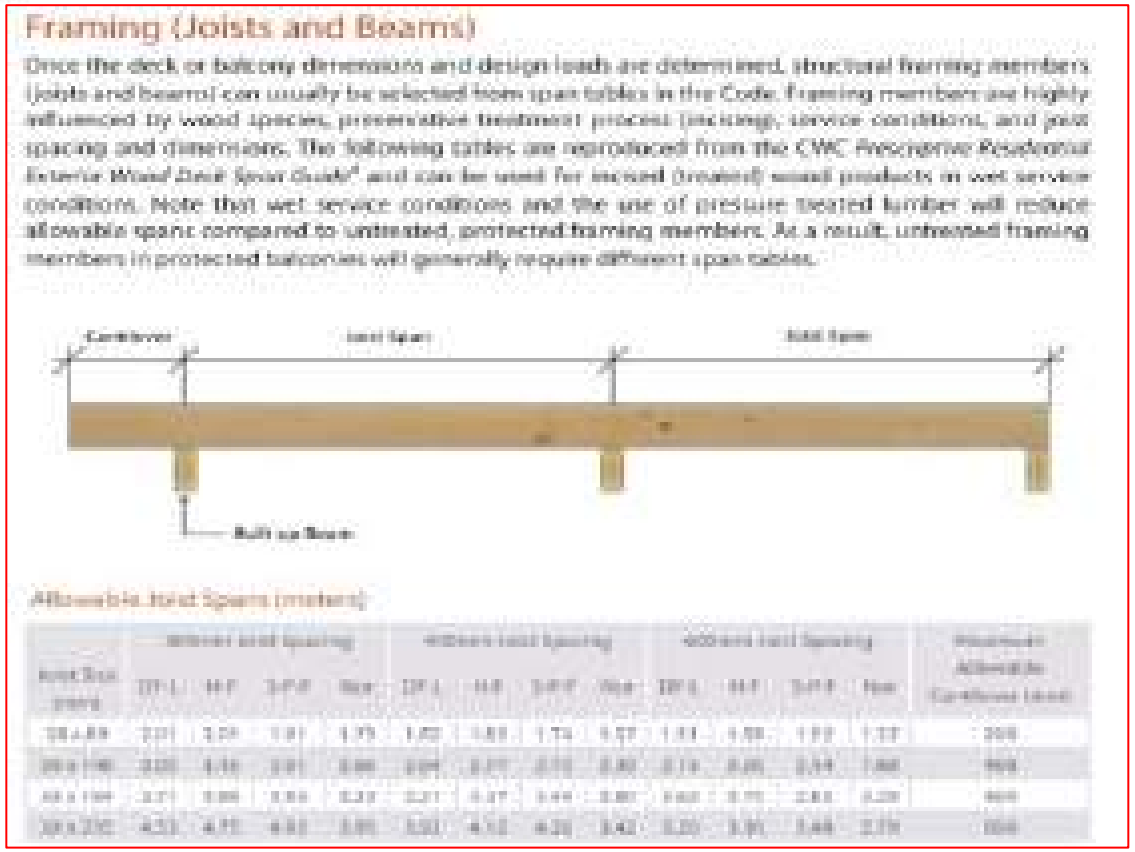


Are deck joists allowed to cantilever?

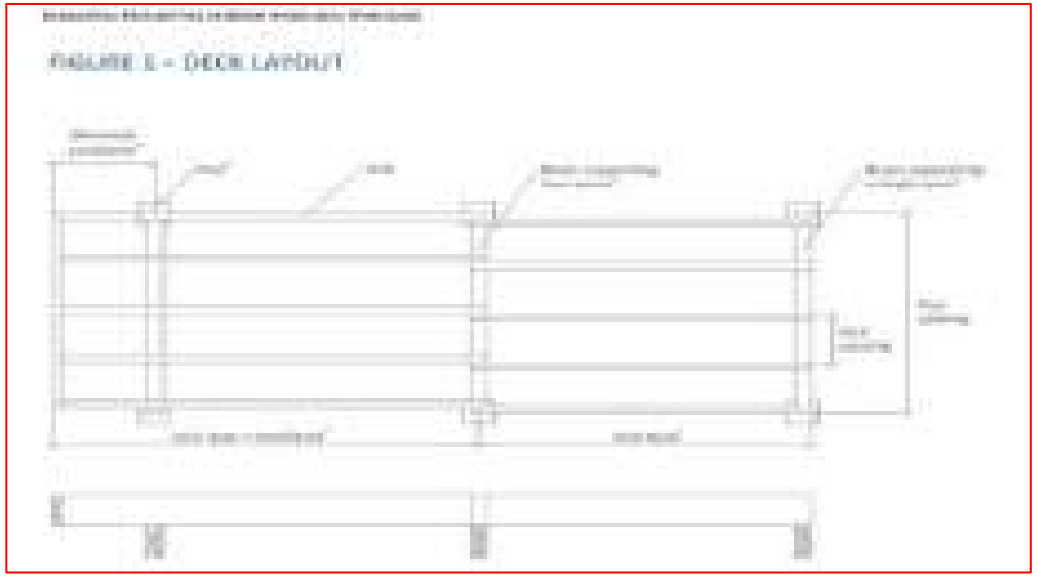
- Extra precautions for stair supports?

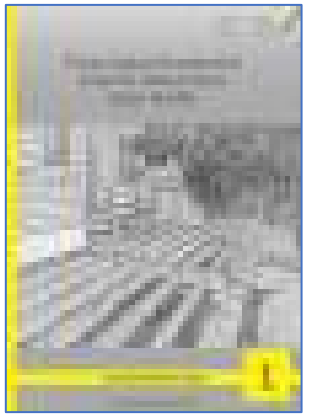
Deck beams should not cantilever beyond columns.

Cantilevered Joist Charts



Illustrated Guide - Building Safe and Durable Wood Decks and Balconies





Prescriptive-Residential-Exterior-Wood-Deck-Span-Guide.pdf

Cantilevered Joist Charts

Typical framing error (member note)

In some homes (1970 – 1980) decks were bult by attaching to the rim joist of a cantilevered bay and squash blocks were used in lieu of hangers. A good sign of a deck built with-out permits.

The deck joists should be brought back to exterior bearing wall.

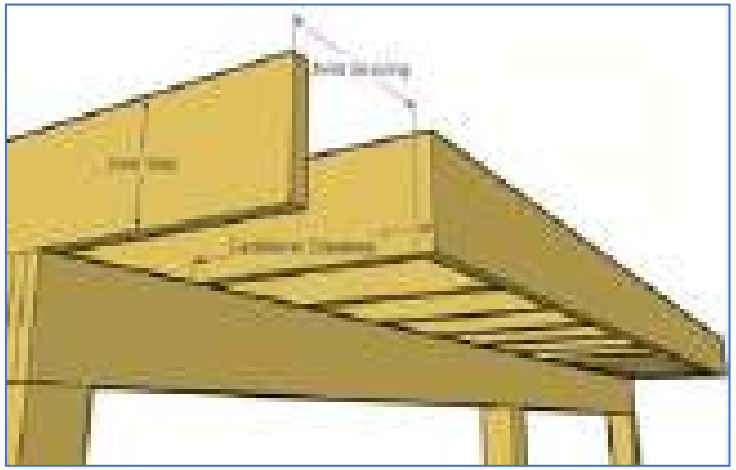
Poll Questions

Poll Question #9

Is it permissible by code to cantilever deck joists and beams.

- **Yes = 34%**
- **No = 6%**
- **No – but typical = 54%**
- **Unsure = 4%**

127 Responses

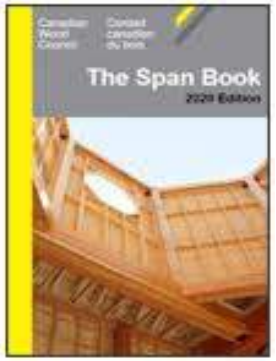


9.23 Wood-Frame Construction

Can also use the Cdn Wood Council Span Book

Types

- Joist Spans
- Roof Joists
- Rafter Spans
- Roof Rafters
- Truss Spans
- Beams
- Lintels
- Deck Joists & Beams



5. Spans

The maximum span is the clear distance between supports. Spans in the tables are given in terms of horizontal projection as follows:

- For horizontal pieces such as floor and ceiling joists, the horizontal projection is the clear length of the piece (see Fig. 1).
- For sloping pieces such as roof rafters, the horizontal projection is the distance measured parallel to the ground (see Fig. 2).

Table G provides a quick method for converting horizontal distance to sloping distance, and vice versa. The overall rafter length however depends on the length of the overhang. (The conversion factor is also shown at the bottom of the rafter tables for convenience.)

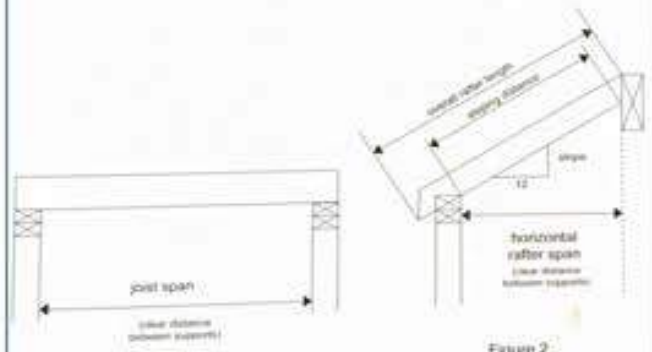


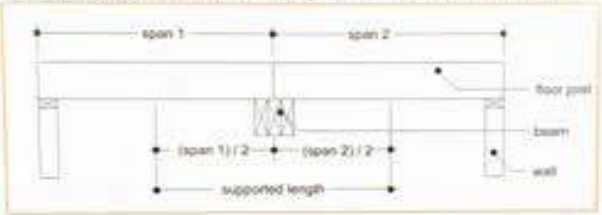
Figure 1 Figure 2

21

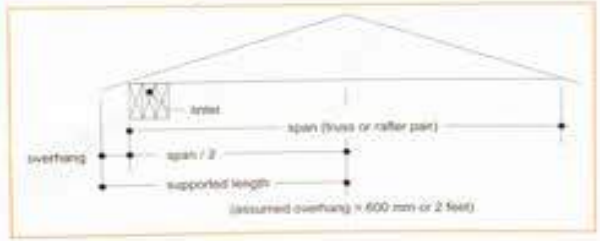
6. Supported Length

The supported length is used to determine the loads on a beam or lintel. Spans for beams and lintels are based on the following assumptions about supported length:

- For **floor beams** in Tables 5 and 6, and for exterior **deck beams** in Table 10, the supported length is half the sum of the joist spans on both sides of the beam as shown in the diagram below. The supported length is assumed to be approximately the same on every floor.



- For **built-up lintels** supporting roof loads in Tables 7 and 8, the supported length is half the span of the roof truss or rafter pair plus the length of the overhang as shown in the diagram below.



23

9.4.2. Specified Loads

9.4.2.1. Application

(See Note A-9.4.2.1. and 9.4.2.2.)

1) This Subsection applies to light-frame constructions whose wall, floor and roof planes are generally comprised of frames of small repetitive structural members, and where

a) the roof and wall planes are clad, sheathed or braced on at least one side,
b) the small repetitive structural members are spaced not more than 600 mm o.c.,
c) the clear span of any structural member does not exceed 12.2 m,
d) the maximum deflection of the structural roof members conforms to Article 9.4.3.1.,
e) the maximum total roof area, notwithstanding any separation of adjoining *buildings* by *firewalls*, is 4 550 m², and
f) for flat roofs, there are no significant obstructions on the roof, such as parapet walls, spaced closer than the distance calculated by

$$D_o = 10\,(H_o - 0.8S_s/\gamma)$$

where

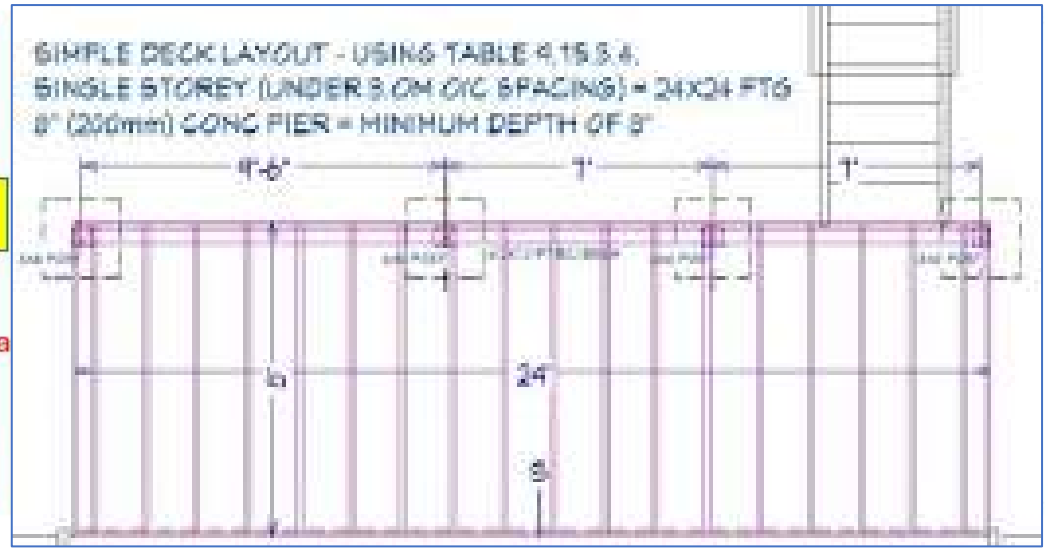
D_o = minimum distance between obstructions, m,
H_o = height of the obstruction above the roof, m,
S_s = ground snow load, kPa, and
γ = specific weight of snow taken as 4.0 kN/m³ or 0.43S_s + 2.2 kN/m³, whichever is lesser.

Figures from CWC 2020 Span Book – 2020 Edition

Rear Deck Joist

1.9kPa = 39.7 psf

Not Pressure Treated



Joist Spa
(8 ft)

Table 10.1a — Maximum Spans, Not Incised (ft-in.)

Deck Joists — Live Load = 39.7 psf

Species	Grade	2x4 Joist spacing (in.) 8	12	16	24	2x6 8	12	16	24	2x8 8	12	16	24
D.Fir-L	No.1/No.2	7-7	6-8	6-1	5-3	12-0	10-6	9-4	7-7	15-10	13-2	11-5	9-3
Hem-Fir	No.1/No.2	7-7	6-8	6-1	5-3	12-0	10-6	9-6	8-0	15-10	13-9	11-11	9-9
S-P-F	No.1/No.2	7-3	6-4	5-9	5-0	11-5	10-0	9-1	7-11	15-1	13-2	11-11	10-1
Northern	No.1/No.2	6-7	5-9	5-2	4-6	10-4	9-0	8-2	6-8	13-7	11-5	9-11	8-1

Species	Grade	2x10 Joist spacing (in.) 8	12	16	24	2x12 8	12	16	24
D.Fir-L	No.1/No.2	19-9	16-1	13-11	11-4	22-11	18-8	16-2	13-2
Hem-Fir	No.1/No.2	20-2	16-10	14-7	11-11	24-0	19-7	16-11	13-10
S-P-F	No.1/No.2	19-3	16-10	15-2	12-4	23-5	20-3	17-7	14-4
Northern	No.1/No.2	17-2	14-0	12-2	9-11	19-11	16-3	14-1	11-6

Notes: See note of Table 10.2b.

Table 10.1b — Maximum Spans, Incised (ft-in.)

Deck Joists — Live Load = 39.7 psf

Species	Grade	2x4 Joist spacing (in.) 8	12	16	24	2x6 8	12	16	24	2x8 8	12	16	24
D.Fir-L	No.1/No.2	7-6	6-6	5-11	4-11	11-10	9-11	8-7	7-0	14-10	12-1	10-6	8-7
Hem-Fir	No.1/No.2	7-6	6-6	5-11	5-3	11-10	10-4	9-6	8-0	14-10	12-9	11-0	9-0
S-P-F	No.1/No.2	7-2	6-3	5-8	4-11	11-3	9-10	8-11	7-6	14-10	12-11	11-5	9-4
Northern	No.1/No.2	6-5	5-7	5-1	4-3	10-2	8-8	7-6	6-1	12-11	10-7	9-2	7-5

Species	Grade	2x10 Joist spacing (in.) 8	12	16	24	2x12 8	12	16	24
D.Fir-L	No.1/No.2	18-2	14-10	12-10	10-6	21-1	17-3	14-11	12-2
Hem-Fir	No.1/No.2	19-1	15-7	13-6	11-0	22-1	18-1	15-8	12-9
S-P-F	No.1/No.2	18-11	16-1	13-11	11-5	22-11	18-8	16-2	13-3
Northern	No.1/No.2	15-10	12-11	11-2	9-1	18-5	15-0	13-0	10-7

Notes: See note of Table 10.2b.

Pressure Treated

Chart from CWC 2020 Span Book – 2020 Edition

Rear Deck Beam

Nominal Supported Length

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Table 10.3b — **Maximum Spans, Incised (ft.-in.)**

Built-Up Decks — **Live Load = 39.7 psf**

Species	Grade	Supported length (ft.)	2x6 2-Ply	2x6 3-PLY	2x6 4-PLY	2x6 5-Ply	2x8 2-PLY	2x8 3-PLY	2x8 4-PLY	2x8 5-Ply
D.Fir-L	No.1/No.2	8	5-0	6-2	7-1	7-11	6-1	7-6	8-8	9-8
		10	4-6	5-6	6-4	7-1	5-5	6-8	7-9	8-8
		12	4-1	5-0	5-9	6-6	5-0	6-1	7-0	7-10
		14	3-9	4-7	5-4	6-0	4-7	5-8	6-6	7-3
		16	3-6	4-4	5-0	5-7	4-4	5-3	6-1	6-10
		18	3-4	4-1	4-8	5-3	4-1	5-0	5-9	6-5
		20	3-2	3-10	4-6	5-0	3-10	4-8	5-5	6-1
Hem-Fir	No.1/No.2	8	5-3	6-5	7-5	8-4	6-5	7-10	9-1	10-1
		10	4-8	5-9	6-8	7-5	5-8	7-0	8-1	9-1
		12	4-3	5-3	6-1	6-9	5-2	6-5	7-5	8-3
		14	3-11	4-10	5-7	6-3	4-10	5-11	6-10	7-8
		16	3-8	4-6	5-3	5-10	4-6	5-6	6-5	7-2
		18	3-6	4-3	4-11	5-6	4-3	5-2	6-0	6-9
		20	3-4	4-1	4-8	5-3	4-0	4-11	5-8	6-5

Species	Grade	Supported length (ft.)	2x10 2-Ply	2x10 3-PLY	2x10 4-PLY	2x10 5-Ply	2x12 2-PLY	2x12 3-PLY	2x12 4-PLY	2x12 5-Ply
D.Fir-L	No.1/No.2	8	7-5	9-2	10-7	11-10	8-8	10-7	12-3	13-8
		10	6-6	8-2	9-5	10-7	7-9	9-6	10-11	12-3
		12	6-1	7-5	8-7	9-8	7-1	8-8	10-0	11-2
		14	5-7	6-11	8-0	8-11	6-6	8-0	9-3	10-4
		16	5-3	6-5	7-5	8-4	6-1	7-6	8-8	9-8
		18	4-11	6-1	7-0	7-10	5-9	7-1	8-2	9-1
		20	4-8	5-9	6-8	7-5	5-5	6-8	7-9	8-8
Hem-Fir	No.1/No.2	8	7-10	9-7	11-1	12-5	9-1	11-2	12-10	14-5
		10	7-0	8-7	9-11	11-1	8-1	9-11	11-6	12-10
		12	6-5	7-10	9-0	10-1	7-5	9-1	10-6	11-9
		14	5-11	7-3	8-4	9-4	6-10	8-5	9-8	10-10
		16	5-6	6-9	7-10	8-9	6-5	7-10	9-1	10-2
		18	5-2	6-5	7-4	8-3	6-0	7-5	8-7	9-7
		20	4-11	6-1	7-0	7-10	5-9	7-0	8-1	9-1

Joist Span (8 ft)

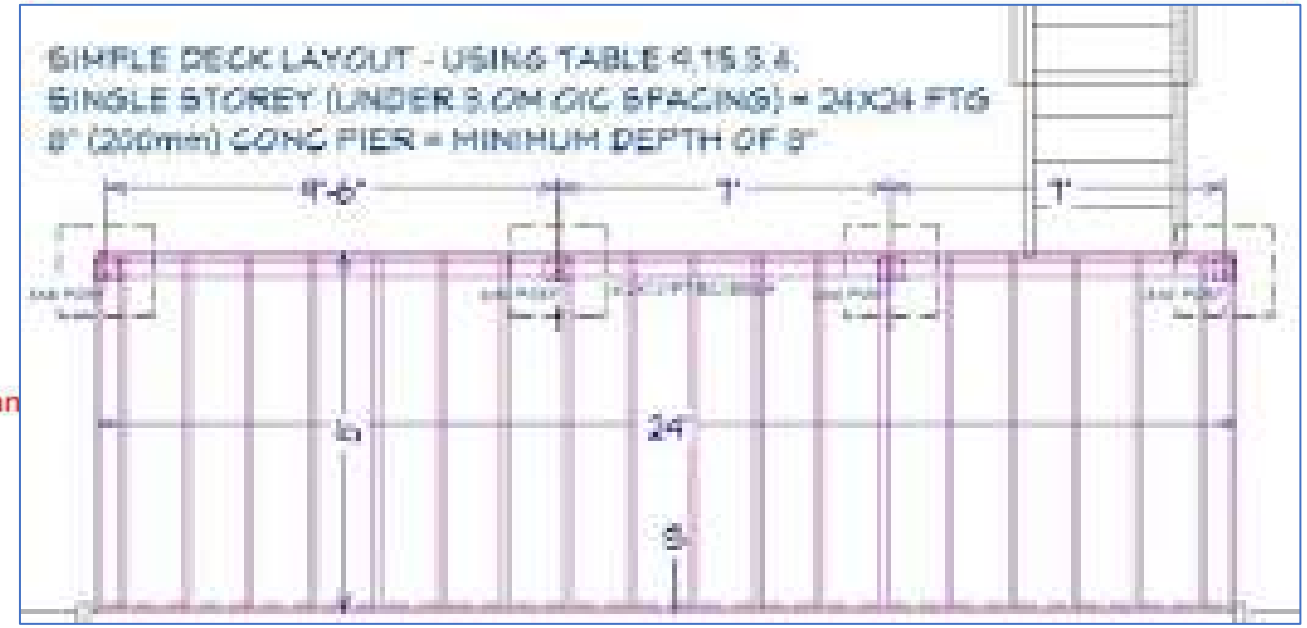


Chart from CWC 2020 Span Book – 2020 Edition

9.23 Wood Frame Construction

9.23.6.1 Anchorage

This Article requires that columns and posts be anchored to resist uplift. Buildings are attached to the tops of columns in a manner that will keep the superstructure from sliding or being lifted up due to wind action.

Exterior columns and posts need to be anchored to resist uplift and lateral movement. Where columns or posts support balconies, decks or verandas, and where the distance from the ground to the underside of joists does not exceed 600 mm (24 in.), the columns or posts must be anchored to the foundation, or the supported joists or beams must be directly anchored to the ground to resist uplift.

Illustrated Users Guide – NBC 2020.

9.23.6.2. Anchorage of Columns and Posts

1) Except as provided in Sentence (2) and (3), exterior columns and posts shall be anchored to resist uplift and lateral movement.

2) Except as provided in Sentence (3), where columns or posts support balconies, decks, verandas or other exterior platforms, and the distance from finished ground to the underside of the joists is not more than 600 mm,

a) the columns or posts shall be anchored to the foundation to resist uplift and lateral movement, or

b) the supported joists or beams shall be directly anchored to the ground to resist uplift.

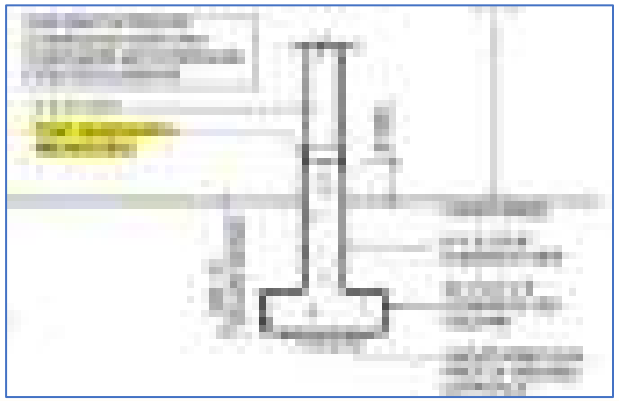
3) Anchorage is not required for platforms described in Sentence (2) that

a) are not more than 1 storey in height,

b) are not more than 55 m² in area,

c) do not support a roof, and

d) are not attached to another structure, unless it can be demonstrated that differential movement will not adversely affect the performance of the structure to which the platform is attached.



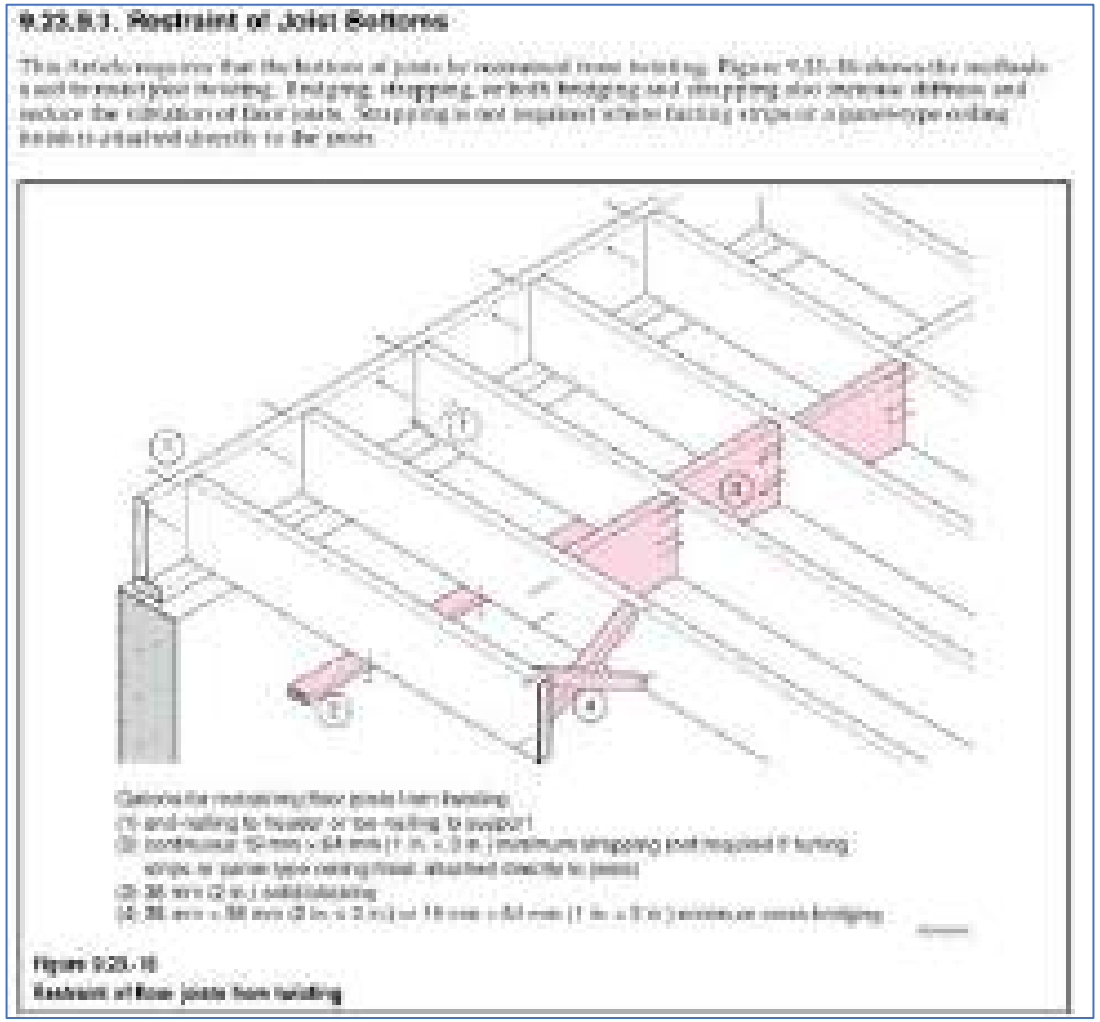
What is an acceptable means of anchorage for a deck column or beam connection?

9.23 Wood Frame Construction

9.23.9.3.Restraint of Joist Bottoms

1) Except as provided in Sentence 9.23.9.4.(1), bottoms of floor joists shall be restrained from twisting at each end by toe-nailing to the supports, end-nailing to the header joists or by providing continuous strapping, blocking between the joists or cross-bridging near the supports.

Or a combination – note CWC Span Book.



Poll Questions

Poll Question #10

Do decks fall under the updated Seismic/Lateral load design requirements?

- Yes = 47%
- No = 13%
- Unsure = 38%

124 Respondents

How is this ledger designed?

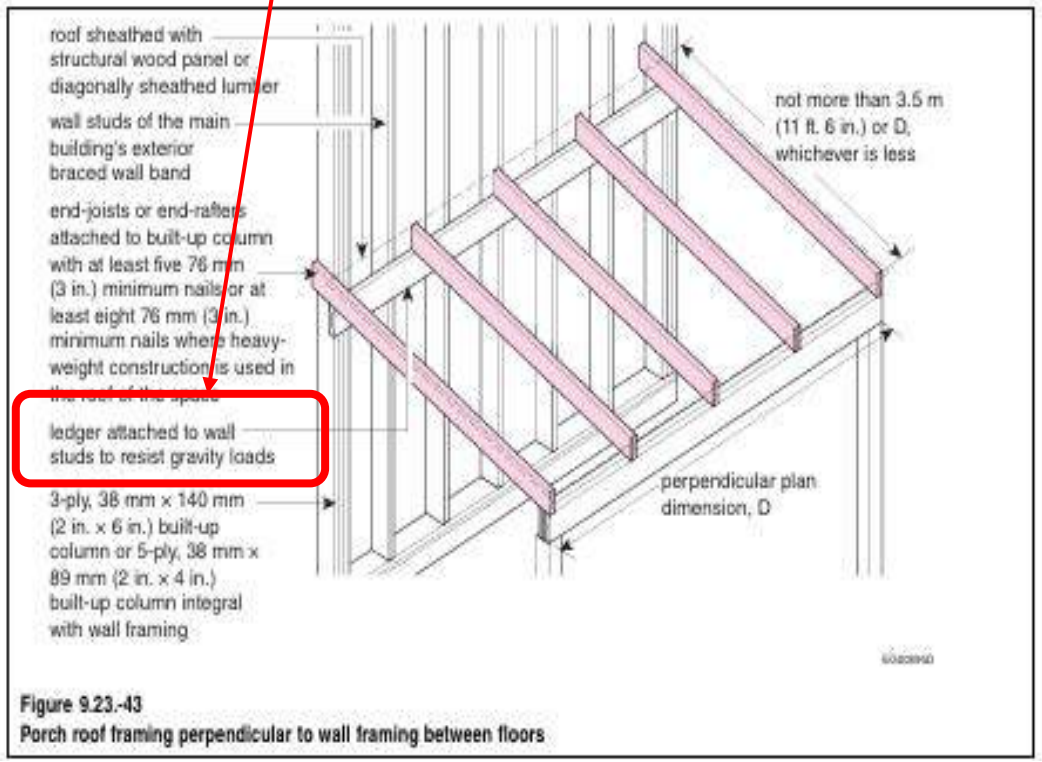


Figure 9.23.-43
Porch roof framing perpendicular to wall framing between floors

Next Lunch and Learns – 2025

<u>March 13th</u> – Review of Illustrated User's Guide National Building Code of Canada 2020 with BC unique elements <u>Or anything that you may want to forward to BSSB.</u>

Please forward any questions or suggestions for the presentation to kkunka@boabc.org.

Questions - Contact Us

Webinar survey to follow.