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April 1, 2017

Construction Industry, Designers, Contractors and Suppliers providing services in Yukon

Advisory #2 – Part 9 Buildings – Stairs, Handrails & Guards

The National Building Code of Canada 2015, (NBC) which is adopted in Yukon, under the Yukon Building Standards Act, contains several provisions that apply to the construction of stairs, handrails and guards for single family dwellings or a house with a secondary suite and Other Type 9 Buildings, which are regulated under Part 9 of the 2015 NBC. We are alerting you to the need for building owners, as well as their designers, builders and material suppliers on their behalf, to comply with the requirements of the 2015 NBC regarding the construction of stairs, handrails and guards in all Part 9 Buildings.

Although the Territory adopts the National Building Code (NBC), it is administered within Whitehorse by the City of Whitehorse, Building Officials and in all other parts of Yukon; the Yukon Government, Building Officials administer it. This enclosed Advisory #2 includes a summary of the applicable Part 9, 2015 NBC provisions for the construction of stairs, handrails and guards for all Part 9 Buildings other than single family dwellings or a house with a secondary suite. Advisory #1 deals with the construction of stairs, handrails, and guards for single family dwellings or a house with a secondary suite. Advisory #3 deals with the construction of Stairs, Barrier-Free Ramps, Handrails and Guards in all buildings that are governed under Part 3 of the 2015 NBC.

We hope that this advisory will help eliminate confusion about the construction requirements of Stairs, Handrails and Guards for all Other Part 9 Buildings and will encourage uniform application of the 2015 NBC requirements throughout Yukon. Please feel free to make copies of this advisory available to your customers as you see fit. Your assistance in achieving these goals is greatly appreciated.

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Part 9 Buildings – Stairs, Handrails & Guards for Part 9 Buildings

Compliance with the Building Standards Act and Regulations are addressed in this advisory. The National Building Code of Canada 2015 (NBC) is adopted by the Building Standards Act. Words in *italics* are defined in the 2015 NBC.

Note: This Advisory #2 applies to the construction requirements of stairs, handrails and *guards* in all Commercial, Industrial & Residential Type Construction which serve more than a Single Family *Dwelling Unit* [Duplexes to Apartment *Buildings* which do not exceeding 600 m² (6500 ft²) In *Building Area* or 3 Storeys in *Building Height*], as these are all regulated under Part 9 of the 2015 NBC and shall comply with the following:

**Part 3 of the 2015 NBC
Subsection 3.3.4. Residential Occupancy**

Article 3.3.4.7. Stairs, Ramps, Landings, Handrails and Guards for Dwelling Units

- 1) Except as required in Article 3.3.4.8., stairs, ramps, landings, handrails and *guards* within a *dwelling unit* shall conform to the appropriate requirements in Section 9.8.
- 2) Exterior stairs, ramps, landings, handrails and *guards* serving a single *dwelling unit*, and loads on *guards* serving not more than two *dwelling units*, shall conform to the appropriate requirements in Section 9.8.

**PART 9 of the 2015 NBC
Section 9.8. Stairs, Ramps, Handrails and Guards**

Article 9.8.1.1. General

- 1) This Section applies to the design and construction of interior and exterior stairs, steps, ramps, handrails and *guards*.

Article 9.8.1.3. Exit Stairs, Ramps and Landings

- 1) Where the stair, ramp or landing forms part of an *exit*, the appropriate requirements in Sections 9.9. and 9.10. shall also apply.

Article 9.8.1.4. Escalators and Moving Walkways

- 1) Escalators and moving *walkways* shall conform to the appropriate requirements in Part 3.

9.8.2. Stair Dimensions

Article 9.8.2.1. Stair Width

- 1) Except as provided in Sentence (2) and Article 9.8.4.7., required *exit* stairs and public stairs serving *buildings of residential occupancy* shall have a width of not less than 900 mm (36").

3) Except as provided in Article 9.8.4.7., required *exit* stairs and public stairs serving *buildings of other than residential occupancy* shall have a width of not less than the greater of

- a) 900 mm (36"), or
- b) 8 mm (5/16") per person based on the *occupant load* limits specified in Table 3.1.17.1.

4) Except as provided in Article 9.8.4.7., at least one stair between each floor level within a *dwelling unit*, and exterior stairs serving a single *dwelling unit* except required *exit* stairs, shall have a width of not less than 860 mm (34").

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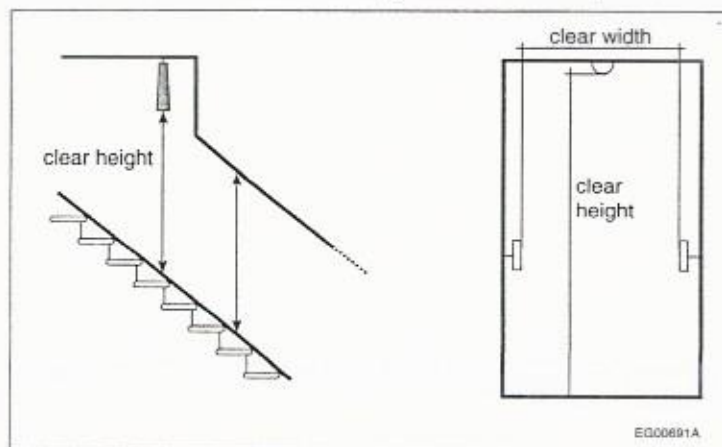
Article 9.8.2.2. Height over Stairs

1) The clear height over stairs shall be measured vertically, over the clear width of the stair, from a straight line tangent to the tread and landing nosings to the lowest point above.

(See Note A-3.4.3.4.)

A-3.4.3.4. Clear Height and Width. Clear height is intended to be measured from a line tangent to the nosings extended to the underside of the lowest element above the walking surface, over the clear width of the exit (see Figure A-3.4.3.4.). Examples of low elements above the walking surface include light fixtures or sprinkler heads and piping.

Clear width is intended to be measured from a line tangent to horizontal protrusions such as handrails.



**Figure A-3.4.3.4.
Measuring clear height**

2) Except as provided in Sentences (3) and (4) and Article 9.8.4.7., the clear height over stairs shall not be less than 2 050 mm (6'-9").

3) Except as provided in Article 9.8.4.7., the clear height over stairs serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces shall not be less than 1 950 mm (6'-5").

9.8.3. Stair Configurations

Article 9.8.3.1. Permitted Configurations

(See Notes A-9.8.3.1. and A-9.8.4.)

1) Stairs in *buildings* other than *dwelling units* and houses with a *secondary suite*, including their common spaces, shall consist of

- a) straight *flights*,
- b) except as provided in Sentence (4), curved *flights*, or
- c) except as provided in Sentence 9.8.4.7.(2), spiral stairs.

4) Curved *flights* in *exits* shall comply with Sentence 3.4.6.9.(2).

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5) All tapered treads within a flight shall turn in the same direction.

A-9.8.3.1. Permitted Stair Configurations.

**Table A-9.8.3.1.
Permitted Stair Configurations**

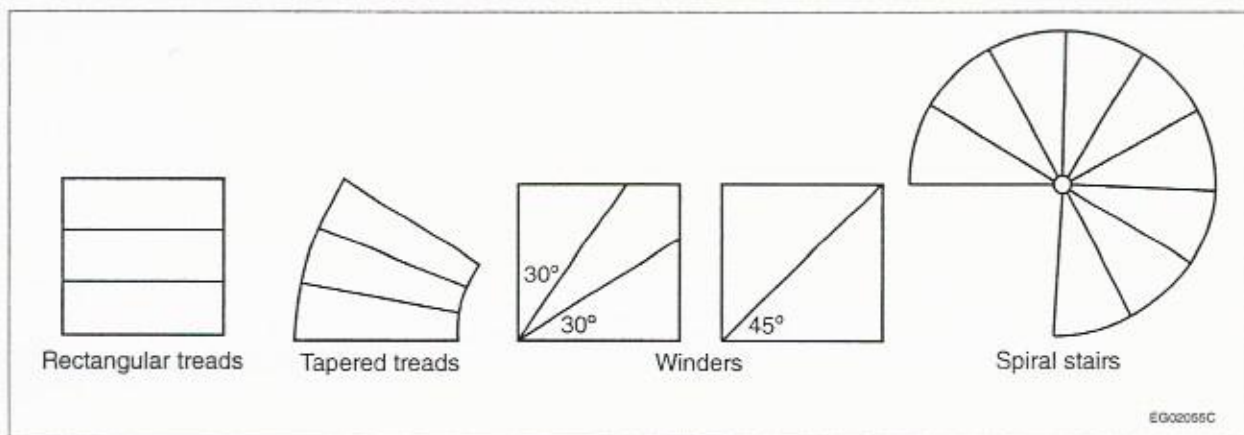
Location/Use of Stairs	Configuration of Stair Treads				
	Straight Flight with Rectangular Treads	Curved Flight with Tapered Treads	Winders	Flight with a mix of Rectangular Treads and Tapered Treads	Spiral Stairs
Stairs within dwelling units	Permitted ⁽¹⁾	Permitted ⁽²⁾	Permitted ⁽³⁾	Permitted ⁽⁴⁾	Permitted ⁽⁵⁾
Public stairs			Not permitted	Not permitted	
Exit stairs		Permitted ⁽⁶⁾	Not permitted	Not permitted	Not permitted

Notes to Table A-9.8.3.1.:

- (1) See Articles 9.8.4.1. and 9.8.4.2.
- (2) See Articles 9.8.4.1. and 9.8.4.3.
- (3) See Article 9.8.4.6.
- (4) See Article 9.8.4.5.
- (5) See Article 9.8.4.7.
- (6) See Articles 3.4.6.9. and 9.8.4.3.

A-9.8.4. Tread Configurations. The Code distinguishes four principal types of stair treads :

- rectangular treads, which are found in straight flights;
- tapered treads, which are found in curved flights;
- winders are described in Note A-9.8.4.6.; and
- spiral stairs, which are described in Note A-9.8.4.7., See Figure A-9.8.4.-A.



**Figure A-9.8.4.-A
Types of treads**

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Article 9.8.3.2. Minimum Number of Risers

1) Except for stairs within a *dwelling unit*, at least 3 risers shall be provided in interior *flights*.

Article 9.8.3.3. Maximum Height of Stairs

1) The vertical height of any *flight* of stairs shall not exceed 3.7 m.

9.8.4. Step Dimensions

(See Note A-9.8.4.)

Articles 9.8.4.1. to 9.8.4.8. specify various dimensional limits for steps. Figure A-9.8.4.-B illustrates the elements of a step and how these are to be measured.

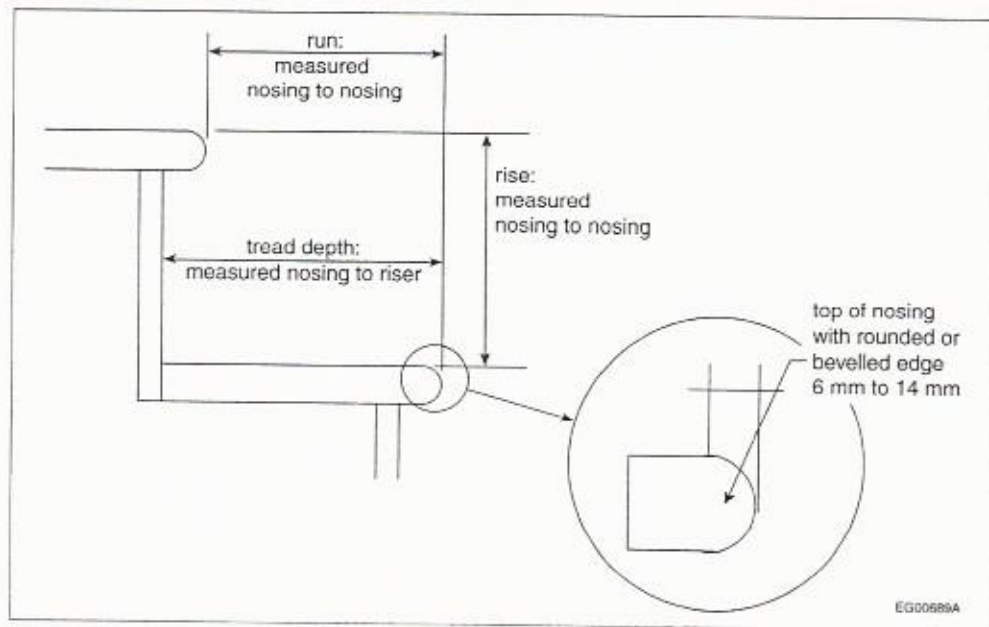


Figure A-9.8.4.-B
Elements of steps and their measurement

Article 9.8.4.1. Dimensions for Risers

(See Note A-9.8.4.)

1) Except as provided in Article 9.8.4.7. and except for stairs serving areas only used as *service rooms* or *service spaces*, the rise, which is measured as the vertical nosing-to-nosing distance, shall comply with Table 9.8.4.1.

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Table 9.8.4.1.
Rise for Rectangular Treads, Tapered Treads and Winders
Forming Part of Sentence 9.8.4.1.(1)

Stair Type	Rectangular Treads, <i>Tapered Treads</i> and Winders	
	Rise, mm	
	Max.	Min.
Private ⁽¹⁾	200	125
Public ⁽²⁾	180	125

Notes to Table 9.8.4.1.:

- (1) Private stairs are exterior and interior stairs that serve
 (a) single *dwelling units*,
 (b) houses with a *secondary suite* including their common spaces, or
 (c) garages that serve a) or b).
 (2) Public stairs are all stairs not described as service stairs or private stairs.

Article 9.8.4.2. Dimensions for Rectangular Treads

(See Note A-9.8.4.)

- 1) Except for stairs serving areas only used as *service rooms* or *service spaces*, the *run* shall comply with Table 9.8.4.2.

Table 9.8.4.2.
Run for Rectangular Treads
Forming Part of Sentence 9.8.4.2.(1)

Stair Type	Rectangular Treads	
	<i>Run</i> , mm	
	Max.	Min.
Private ⁽¹⁾	355	255
Public ⁽²⁾	No limit	280

Notes to Table 9.8.4.2.:

- (1) Private stairs are exterior and interior stairs that serve
 (a) single *dwelling units*,
 (b) houses with a *secondary suite* including their common spaces, or
 (c) garages that serve a) or b).
 (2) Public stairs are all stairs not described as service stairs or private stairs.
 2) The depth of a rectangular tread shall be not less than its *run* and not more than its *run* plus 25 mm (1").

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Article 9.8.4.3. Dimensions of Tapered Treads

(See Note A-9.8.4.)

- 1) Except as provided in Sentence (2) and Articles 9.8.4.6. and 9.8.4.7., *tapered treads* shall have a *run* that
 - a) is not less than 150 mm (6") at the narrow end of the tread, and
 - b) complies with the dimensions stated in Table 9.8.4.2. when measured at a point 300 mm (12") from the centre line of the handrail at the narrow end of the tread.
- 2) *Tapered treads* in required *exit* stairs shall conform to the requirements in Article 3.4.6.9.
- 3) The depth of a *tapered tread* shall be not less than its *run* at any point and not more than its *run* at any point plus 25 mm (1").

Article 9.8.4.4. Uniformity and Tolerances for Risers, Runs and Treads

- 1) Except as provided in Sentence (2), risers shall be of uniform height in any one *flight*, with a maximum tolerance of
 - a) 5 mm (3/16") between adjacent treads or landings, and
 - b) 10 mm (3/8") between the tallest and shortest risers in a *flight*.
- 2) Except for required *exit* stairs, where the top or bottom riser in a stair adjoins a sloping finished walking surface, such as a garage floor, driveway or sidewalk, the height of the riser across the stairs shall vary by not more than 1 in 12.
- 3) Rectangular treads shall have a uniform *run* with a maximum tolerance of
 - a) 5 mm (3/16") between adjacent treads, and
 - b) 10 mm (3/8") between the deepest and shallowest runs and treads in a *flight*.
- 4) *Tapered treads* in a *flight* shall have a uniform *run* in accordance with the construction tolerances stipulated in Sentence (3) when measured at a point 300 mm (12") from the centre line of the handrail as described in Sentence 9.8.7.1.(5).
- 5) The slope of treads shall not exceed 1 in 50.

Article 9.8.4.5. Uniformity of Runs in Flights with Mixed Treads within Dwelling Units

- 1) Except as provided in Sentence (2) and Article 9.8.4.6., where a *flight* of stairs consists of both *tapered treads* and rectangular treads, all the treads shall have a uniform *run* when measured at a point 300 mm (12") from the centre line of the inside handrail.
- 2) Where *tapered treads* are located at the bottom of a mixed-tread *flight*, the *run* of the *tapered treads* when measured at a point 300 mm (12") from the centre line of the inside handrail is permitted to exceed the *run* of the rectangular treads.

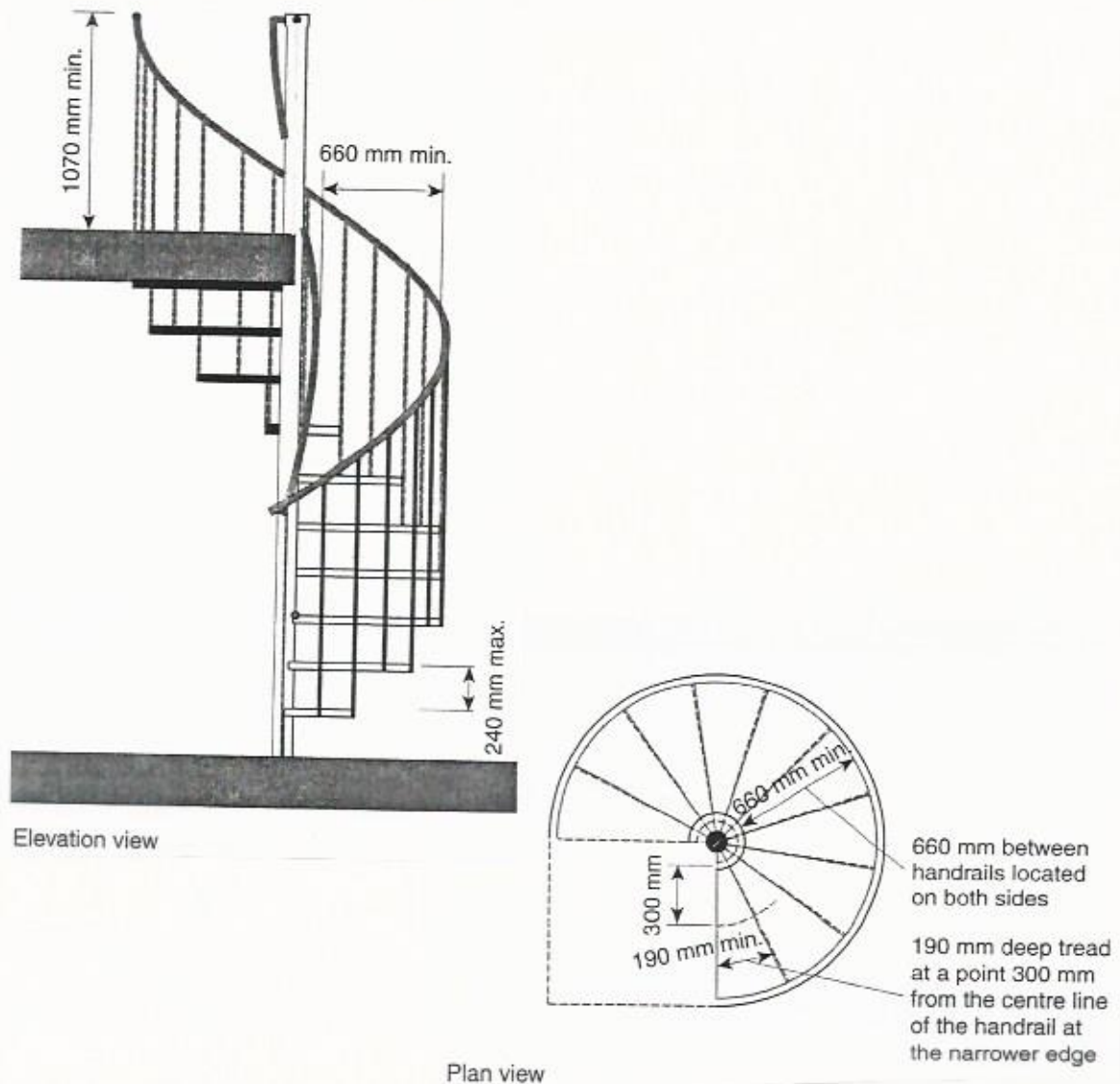
9.8.4.7. Spiral Stairs (See Note A-9.8.4.7.)

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A-9.8.4.7. Spiral Stairs. A spiral stair is typically described as a stair with a circular plan having uniform treads that radiate from and wind around a common central post or supporting column.

In the context of the Code, the term “spiral stair” is used to describe any stair where:

- (a) the plan of the treads forms part or all of a circle,
- (b) the minimum stair width and tread depth are less than those required for curved stairs, and
- (c) the maximum riser height is greater than that permitted in all other stair configurations.



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Figure A-9.8.4.7.
Spiral stairs

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- 1) Spiral stairs shall have
 - a) handrails on both sides, the outer handrail being not less than 1 070 mm (42") high,
 - b) a clear width not less than 660 mm (26") between the handrails,
 - c) risers that are not more than 240 mm (9 3/8") high,
 - d) treads that
 - i) are a minimum of 190 mm (7 1/2") deep at a point 300 mm (12") from the centre line of the handrails at the narrower edge,
 - ii) have a consistent angle and uniform dimension, and
 - iii) turn in the same direction, and
 - e) not less than 1 980 mm (78") clear height.
- 2) Spiral stairs conforming to Sentence (1) are permitted to be used as the only *means of egress* where they serve not more than 3 persons.
- 3) Spiral stairs shall not serve as an *exit*.

Article 9.8.4.8. Tread Nosings (See Notes A-9.8.4.8. and A-9.8.4.)

A-9.8.4.8. Tread Nosings. A sloped or beveled edge on tread nosings will make the tread more visible through light modeling. The sloped portion of the nosing must not be too wide so as to reduce the risk of slipping of the foot. See Figure A-9.8.4.-B.

- 1) Except as permitted by Sentence (2) the top of the nosings of stair treads shall have a rounded or bevelled edge extending not less than 6 mm (1/4") and not more than 14 mm (9/16") measured horizontally from the front of the nosing.
- 2) If resilient material is used to cover the nosing of a stair tread, the minimum extension of the rounded or bevelled edge required by Sentence (1) is permitted to be reduced to 3 mm (1/8").

9.8.5. Ramps

Article 9.8.5.1. Application

- 1) This Subsection applies to pedestrian ramps, except ramps in a *barrier-free* path of travel.
- 2) Ramps in a *barrier-free* path of travel shall conform to the requirements in Article 3.8.3.5.

Article 3.8.3.5. Ramps

- 1) A ramp located in a *barrier-free* path of travel shall
 - a) have a clear width not less than 870 mm (34 1/4") (see Note A-3.4.3.4.),
 - b) have a slope not more than 1 in 12 (see Note A-3.8.3.5.(1)(b)),

A-3.8.3.5.(1)(b) Ramp Slopes. Ramps with a slope of more than 1 in 16 can be very difficult for persons with physical disabilities with upper body mobility to manage. Even though they pose less of a problem for persons in motorized wheelchairs, these ramps can be unsafe to descend, especially in cold climates. Although Article 3.8.3.5. permits slopes on ramps as great as 1 in 12 for distances of up to 9 m (30'), slopes of 1 in 20 are safer and less strenuous. When limited space is available, as may be the case during renovations, ramps with a slope of up to 1 in 12 should be restricted to lengths not exceeding 3 m (10') whenever possible. A strip contrasting in colour and texture should be used at the top and bottom of ramps to warn persons with low or no vision.

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c) have a level area not less than 1 500 (5') by 1 500 mm (5') at the top and bottom and at intermediate levels of a ramp leading to a door, so that on the latch side the level area extends not less than

- i) 600 mm (24") beyond the edge of the door opening where the door opens towards the ramp, or
 - ii) 300 mm (12") beyond the edge of the door opening where the door opens away from the ramp,
- (see Note A-3.8.3.5.(1)(c)),

A-3.8.3.5.(1)(c) Landing Design at Doorways Leading to Ramps.

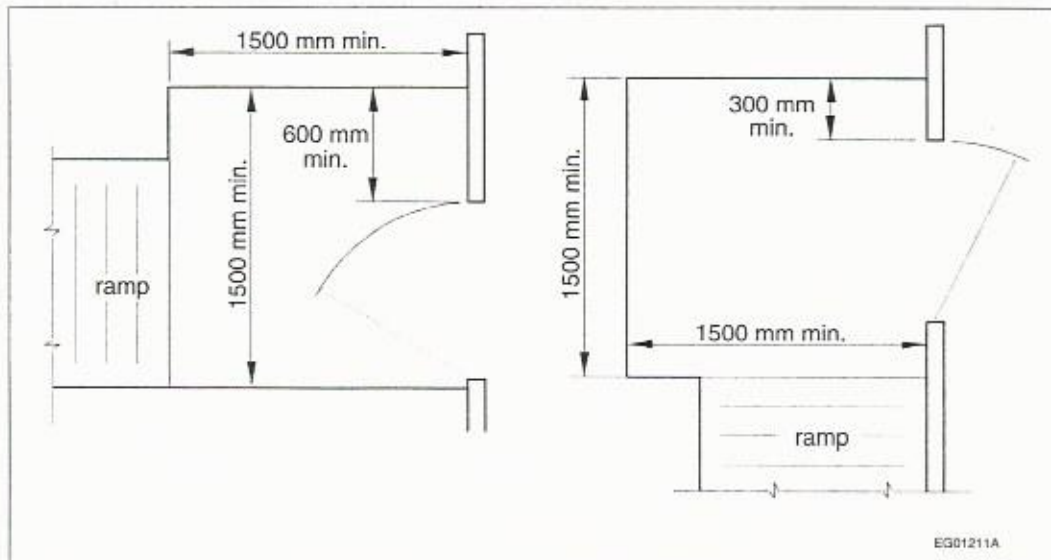


Figure A-3.8.3.5.(1)(c)
Landing design at doorways leading to ramps

- d) have a level area not less than 1 200 mm (4') long and at least the same width as the ramp
 - i) at intervals not more than 9 m (30') along its length, and
 - ii) where there is an abrupt change in the direction of the ramp, and
- e) except as provided in Sentences (2) and (3), be equipped with handrails conforming to Article 3.4.6.5., except that they shall be not less than 865 mm (34") and not more than 965 mm (38") high, and
- f) be equipped with *guards* conforming to Article 3.4.6.6.

2) Handrails installed in addition to required handrails need not comply with the height requirements stated in Clause (1)(e).

3) The requirement for handrails in Clause (1)(e) need not apply to a ramp serving as an aisle for fixed seating.

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- 4) The surfaces of ramps and landings shall
- a) be hard or resilient where the ramp is steeper than 1 in 15 (see Note A-3.8.3.5.(4)(a)),
A-3.8.3.5.(4)(a) Surface of Ramps. Sentence 3.8.3.2.(2) requires that all walking surfaces in a barrier-free path of travel be stable and firm to limit the effort required by persons using wheelchairs or other mobility aids. Therefore, Sentence 3.8.3.5.(4) requires that hard or resilient flooring be used on the surfaces of steeper ramps. Furthermore, carpet and like materials should not be installed on any ramp.
 - b) have a cross slope no steeper than 1 in 50, and
 - c) where exposed to water, be designed to drain.
- 5) Ramps and landings not at *grade* or adjacent to a wall shall have edge protection consisting of
- a) a curb not less than 75 mm (3") high, or
 - b) a raised barrier or rail located not more than 100 mm (3 7/8") from the ramp or landing surface.
- 6) Floors or walks in a *barrier-free* path of travel having a slope steeper than 1 in 20 shall be designed as ramps.

Article 9.8.5.2. Ramp Width

(See also Article 9.9.3.2.)

- 1) Except as provided in Sentence (2), ramps shall be not less than 1 100 mm (44") wide.
- 2) Ramps serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces shall be not less than 860 mm (33 7/8") wide.

Article 9.8.5.3. Height over Ramps

- 1) Except as permitted by Sentence (2), the clear height over ramps shall be not less than 2 050 mm (6'-9").
- 2) The clear height over ramps serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces shall be not less than 1 950 mm (6'-5").

Article 9.8.5.5. Maximum Rise

- 1) Where the slope of the ramp is greater than 1 in 12, the maximum rise between floors or landings shall be 1 500 mm (5').

9.8.6. Landings

Article 9.8.6.1. Application

- 1) This Subsection applies to landings, except landings for ramps in a *barrier-free* path of travel.
- 2) Landings for ramps in a *barrier-free* path of travel shall conform to the requirements in Article 3.8.3.5.
- 3) Finished floors, and ground surfaces with a slope not exceeding 1 in 50, at the top and bottom of stairs or ramps shall be considered as landings.

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Article 9.8.6.2. Required Landings

- 1) Except as provided in Sentences (2) to (4) and Sentence 9.9.6.6.(2), a landing shall be provided
- at the top and bottom of each *flight* of interior and exterior stairs, including stairs in garages,
 - at the top and bottom of every ramp with a slope greater than 1 in 50,
 - where a doorway opens onto a stair or ramp,
 - where a ramp opens onto a stair, and
 - where a stair opens onto a ramp.

2) Where a door at the top of a stair within a *dwelling unit* swings away from the stair, no landing is required between the doorway and the stair.

3) A landing may be omitted at the top of an exterior *flight* serving a secondary entrance to a single *dwelling unit* or a house with a *secondary suite*, provided

- the stair does not contain more than 3 risers,
- the principal door is a sliding door or swings away from the stair, and
- only a storm or screen door, if any, swings over the stair and is equipped with hardware to hold it open.

4) A landing may be omitted at the bottom of an exterior stair or ramp provided there is no obstruction, such as a gate or door, within the lesser of the width of the stair or ramp or

- 900 mm (36") for stairs or ramps serving a single *dwelling unit*, and
- 1 100 mm (44") for stairs or ramps not serving a single *dwelling unit*.

Article 9.8.6.3. Dimensions of Landings

(See Note A-3.4.6.4.) (See also Articles 9.9.6.1. and 9.9.6.6. regarding landings in *exits*.)

1) Except as provided in Sentences (2) to (7), landings shall be at least as wide and as long as the width of the stair or ramp in which they occur.

2) Where the landing in a stairway or ramp does not turn or turns less than 90°, the length of the landing need not be more than the lesser of

- the required width of the stair or ramp, or
- 1 100 mm (44").

3) The length of a landing shall be measured perpendicular to the nosings of adjacent steps or to the end of the ramp, at a distance equal to half the length required in Sentence (2) from the narrow edge of the landing.

4) Where stair *flights* or ramps of different widths adjoin a single landing, the minimum width of the landing shall be

- where one or more of the stair or ramp widths do not exceed their respective required widths, not less than the greater required stair or ramp width, or
- where all of the widths of the stairs or ramps exceed their respective required widths, not less than the lesser actual stair or ramp width.

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- 5) Where a door swings toward a stair, the full arc of the swing shall be over the landing.
- 6) The slope of landings shall not exceed 1 in 50.
- 7) Where a doorway or stairway opens onto the side of a ramp, the landing shall extend for a distance of not less than 300 mm (12") on either side of the doorway or stairway, except on a side abutting an end wall.

A-3.4.6.4. Dimensions of Landings. A landing is a floor area provided at the top or bottom of a flight of stairs or a ramp, or a platform built as part of a stairway or ramp. Landings provide a safe surface for users to rest upon, allow design flexibility, and facilitate a change in direction.

Figure A-3.4.6.4. illustrates how to measure the length of a landing for various landing configurations turning less than 90°, including straight landings.

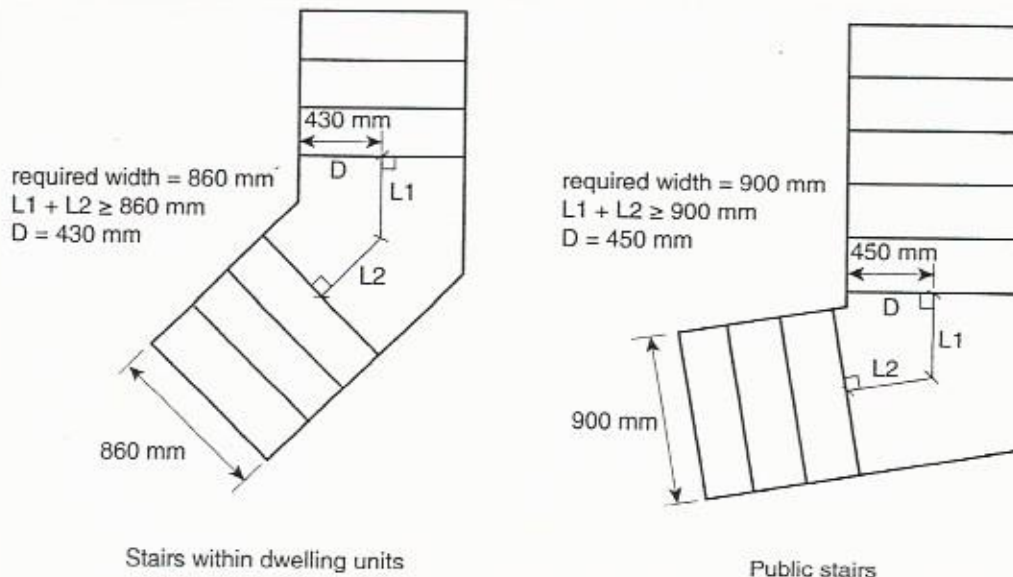


Figure A-3.4.6.4.

Landing configurations

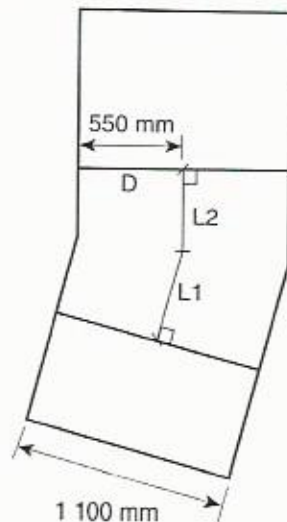
Notes to Figure A-3.4.6.4.:

(1) L1 + L2 = length of the landing
= the lesser of the required width of the stair or ramp, or 1 100 mm
See Sentences 3.4.6.4.(2) and 9.8.6.3.(2).

(2) D = distance from the narrow edge where the length of the landing is measured
= half the required length of the landing

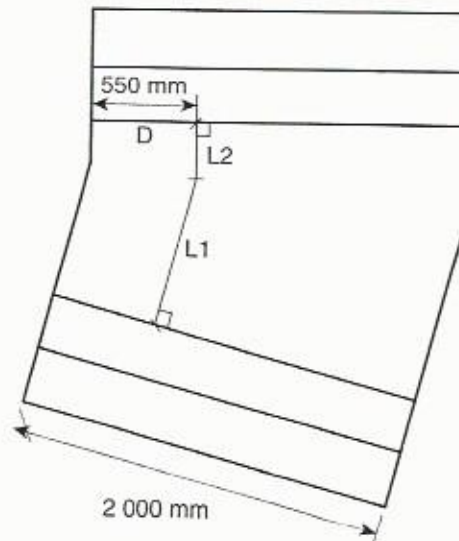
See Sentences 3.4.6.4.(3) and 9.8.6.3.(3).

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required width = 1 100 mm
 $L1 + L2 \geq 1\ 100\ \text{mm}$
 $D = 550\ \text{mm}$

Exit ramp
 (not part of a barrier-free path of travel)



required width = 2 000 mm
 $L1 + L2 \geq 1\ 100\ \text{mm}$
 $D = 550\ \text{mm}$

Wide stairs

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Figure A-3.4.6.4.

Landing configurations

Notes to Figure A-3.4.6.4.:

(1) $L1 + L2$ = length of the landing
 = the lesser of the required width of the stair or ramp, or 1 100 mm
 See Sentences 3.4.6.4.(2) and 9.8.6.3.(2).

(2) D = distance from the narrow edge where the length of the landing is measured
 = half the required length of the landing
 See Sentences 3.4.6.4.(3) and 9.8.6.3.(3).

Article 9.8.6.4. Height over Landings

1) Except as permitted by Sentence (2), the clear height over landings shall be not less than 2 050 mm (6'-9").

2) The clear height over landings serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces shall be not less than 1 950 mm (6'-5").

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9.8.7. Handrails

Article 9.8.7.1. Required Handrails

1) Except as provided in Sentences (2) to (4), handrails shall be installed on stairs and ramps in accordance with Table 9.8.7.1.

Table 9.8.7.1. Number of Sides of Stair or Ramp Required to Have a Handrail
Forming Part of Sentence 9.8.7.1.(1)

Location of Stair or Ramp	Handrails Serving Stairs			Handrails Serving Ramps	
	Stairs < 1 100 mm Wide		Stairs ≥ 1 100 mm Wide	Ramps < 1 100 mm Wide	Ramps ≥ 1 100 mm Wide
	Straight	Curved	All	Straight or Curved	All
Number of Sides Required to Have a Handrail					
Within a <i>dwelling unit</i> or a house with a <i>secondary suite</i>	1	1	1	1	2
All other locations ⁽¹⁾	1	2	2	2	2

Notes to Table 9.8.7.1.:(1) See Sentences 9.8.7.1.(2), (3) and (4) for exceptions.

2) Except where a stair or ramp serves not more than two *dwelling units*, at least one handrail shall be located not more than 750 mm (29.5") from the natural path of travel on the stair or ramp. (See Note A-9.8.7.1.(2).)

A-9.8.7.1.(2) Wider Stairs than Required. The intent of Sentence 9.8.7.1.(2) is that handrails be installed in relation to the required exit width only, regardless of the actual width of the stair and ramp. The required handrails are provided along the assumed natural path of travel to and from the building.

3) Handrails are not required for stairs and ramps serving a single *dwelling unit*, where
a) interior stairs have not more than 2 risers,
b) exterior stairs have not more than 3 risers, or
c) ramps rise not more than 400 mm (16").

4) Only one handrail is required on exterior stairs having more than 3 risers provided such stairs serve not more than one *dwelling unit* or a house with a *secondary suite*.

5) Except for stairs with winders, where a *flight* of stairs within a *dwelling unit* consists of *tapered treads*, or a mix of *tapered treads* and rectangular treads, one handrail shall be installed along the narrow end of the treads.

Article 9.8.7.2. Continuity of Handrails
(See Note A-9.8.7.2.)

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A-9.8.7.2. Continuity of Handrails. The guidance and support provided by handrails is particularly important at the beginning and end of ramps and flights of stairs and at changes in direction such as at landings and winders.

The intent of the requirement in Sentence (2) for handrails to be continuous throughout the length of the stair is that the handrail be continuous from the bottom riser to the top riser of the stair. (See Figure A-9.8.7.2.)

For stairs or ramps serving a single dwelling unit, the intent of the requirement for handrails to be continuous throughout the length of the flight is that the handrail be continuous from the bottom riser to the top riser of the flight. The required handrail may start back from the bottom riser only if it is supported by a newel post or volute installed on the bottom tread. (See Figure A-9.8.7.2.) With regard to stairs serving a single dwelling unit, the handrail may terminate at landings.

In the case of stairs within dwelling units that incorporate winders, the handrail should be configured so that it will in fact provide guidance and support to the stair user throughout the turn through the winder.

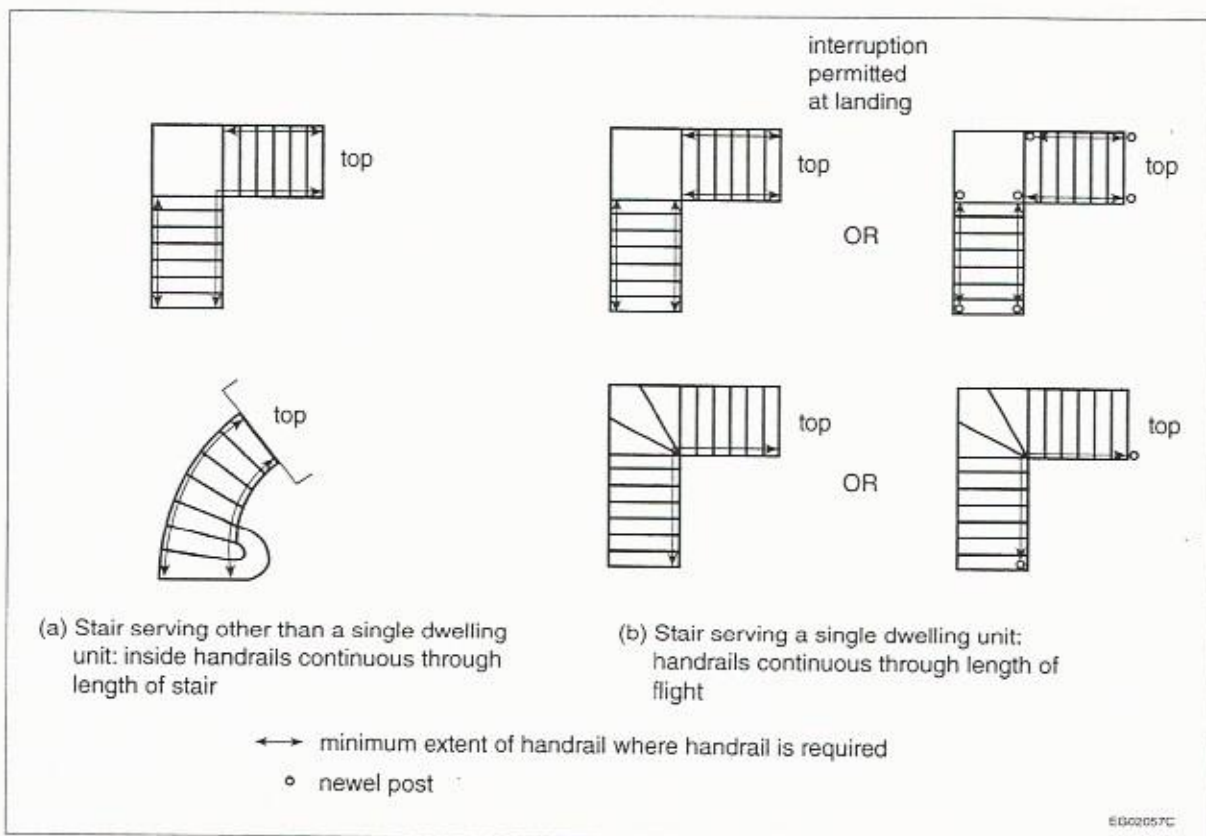


Figure A-9.8.7.2.

Continuity of handrails at the top and bottom of stairs and flights

Note to Figure A-9.8.7.2.: (1) See Article 9.8.7.1. to determine the number of handrails required. Some stairs will require only one, while some will require two or more.

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- 1) Except as provided in Sentence (3), required handrails shall be continuously graspable throughout the length of
- ramps, and
 - flights* of stairs, from the bottom riser to the top riser.

2) Except for stairs or ramps serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces, at least one required handrail shall be continuous throughout the length of the stair or ramp, including at the landing except where interrupted by doorways. (See Note A-3.4.6.5.(10).)

A-3.4.6.5.(10) Continuity of Handrail. Blind or visually-impaired persons rely on handrails to guide them on stairways. A continuous handrail will assist them in negotiating stairs at changes in direction. The extended handrail is useful to persons with physical disabilities to steady themselves before using the stairs. Handrails should, however, return to the wall, floor or post, so as not to constitute a hazard to blind or visually-impaired persons.

3) For stairs or ramps serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces, a handrail is permitted to start from a newel post or volute installed on the bottom tread.

Article 9.8.7.3. Termination of Handrails

1) Handrails shall be terminated in a manner that will not obstruct pedestrian travel or create a hazard. (See Note A-9.8.7.3.(1).)

A-9.8.7.3.(1) Termination of Handrails. Handrails are required to be installed so as not to obstruct pedestrian travel. To achieve this end, the rail should not extend so far into a hallway as to reduce the clear width of the hallway to less than the required width. Where the stair terminates in a room or other space, likely paths of travel through that room or space should be assessed to ensure that any projection of the handrail beyond the end of the stair will not interfere with pedestrian travel. As extensions of handrails beyond the first and last riser are not required in dwelling units (see Sentence 9.8.7.3.(2)) and as occupants of dwellings are generally familiar with their surroundings, the design of dwellings would not generally be affected by this requirement.

Handrails are also required to terminate in a manner that will not create a safety hazard to blind or visually impaired persons, children whose heads may be at the same height as the end of the rail, or persons wearing loose clothing or carrying items that might catch on the end of the rail. One approach to reducing potential hazards is returning the handrail to a wall, floor or post. Again, within dwelling units, where occupants are generally familiar with their surroundings, returning the handrail to a wall, floor or post may not be necessary. For example, where the handrail is fastened to a wall and does not project past the wall into a hallway or other space, a reasonable degree of safety is assumed to be provided; other alternatives may provide an equivalent level of protection.

2) Except for stairs and ramps serving only one *dwelling unit* or a house with a *secondary suite* including their common spaces, at least one handrail at the sides of a stair or ramp shall extend horizontally not less than 300 mm (12") beyond the top and bottom of each *flight* or ramp. (See Note A-9.8.7.3.(2).)

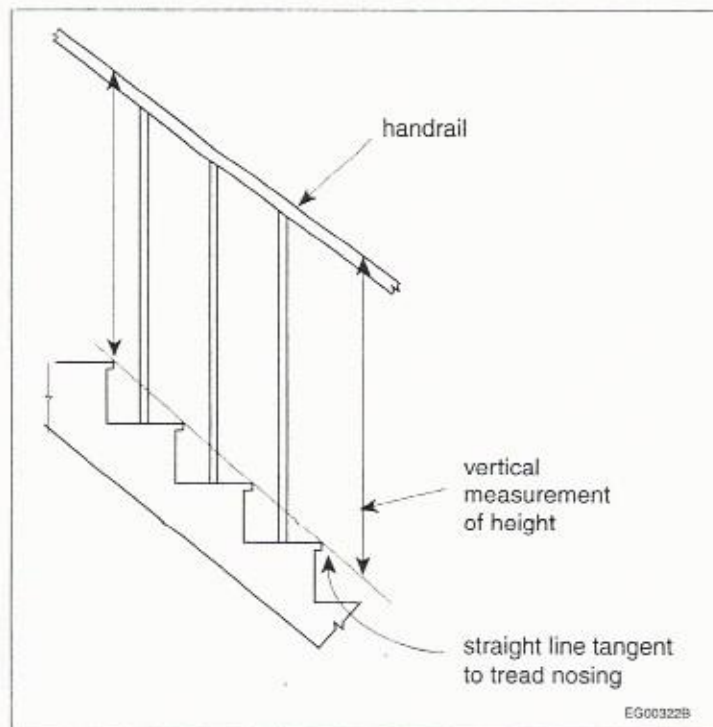
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A-9.8.7.3.(2) Handrail Extensions. As noted in Note A-9.8.7.2., the guidance and support provided by handrails is particularly important at the beginning and end of ramps and flights of stairs and at changes in direction. The extended handrail provides guidance and allows users to steady themselves upon entering or leaving a ramp or flight of stairs. Such extensions are particularly useful to visually-impaired persons, and persons with physical disabilities or who are encumbered in their use of the stairs or ramp.

Article 9.8.7.4. Height of Handrails

(See Note A-9.8.7.4.)

A-9.8.7.4. Height of Handrails. Figure A-9.8.7.4. illustrates how to measure handrail height.



**Figure A-9.8.7.4.
Measuring handrail height**

- 1) The height of handrails on stairs and ramps shall be measured vertically from the top of the handrail to
 - a) a straight line drawn tangent to the tread nosings of the stair served by the handrail, or
 - b) the surface of the ramp, floor or landing served by the handrail.

2) Except as provided in Sentence (3) and Clause 3.8.3.5.(1)(e), required handrails shall be 865 mm (34") to 1 070 mm (42") high.

3) Handrails installed in addition to required handrails need not comply with Sentence (2).

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Article 9.8.7.5. Ergonomic Design

- 1) The clearance between a handrail and the surface behind it shall be not less than
 - a) 50 mm (2"), or
 - b) where said surface is rough or abrasive, 60 mm (2 3/8").

2) All handrails shall be constructed so as to be continually graspable along their entire length with no obstruction on or above them to break a handhold. (See Note A-9.8.7.5.(2).)

A-9.8.7.5.(2) Handrail Sections. Handrails are intended to provide guidance and support to stair users. To fulfil this intent, handrails must be "graspable."

The graspable portion of a handrail should allow a person to comfortably and firmly grab hold by allowing their fingers and thumb to curl under part or all of the handrail. Where the configuration or dimensions of the handrail do not allow a person's fingers and thumb to reach the bottom of it, recesses that are sufficiently wide and deep to accommodate a person's fingers and thumb must be provided on both sides of the handrail, at the bottom of the graspable portion, which must not have any sharp edges.

Article 9.8.7.6. Projections into Stairs and Ramps

- 1) Handrails and constructions below handrails, including handrail supports and stair stringers, shall not project more than 100 mm (3 7/8") into the required width of a stair or ramp. (See also Articles 9.8.2.1. and 9.8.5.2.)

Article 9.8.7.7. Design and Attachment of Handrails

(See Note A-9.8.7.7.)

A-9.8.7.7. Attachment of Handrails. Handrails are intended to provide guidance and support to the stair user and to arrest falls. The loads on handrails may therefore be considerable. The attachment of handrails serving a single dwelling unit may be accepted on the basis of experience or structural design.

- 1) Handrails and their supports shall be designed and constructed to withstand the following loads, which need not be considered to act simultaneously:

- a) a concentrated load of not less than 0.9 kN applied at any point and in any direction for all handrails, and
- b) for handrails other than those serving a single *dwelling unit*, a uniform load of not less than 0.7 kN/m.

- 2) Where exterior or interior handrails serving a single *dwelling unit* or a house with a *secondary suite* including their common spaces are attached to wood studs or blocking, the attachment shall be deemed to comply with Sentence (1), where

- a) the attachment points are spaced not more than 1.2 m apart measured on the horizontal plane,
- b) the first attachment point at either end is located no more than 300 mm (12") from the end of the handrail, and
- c) the fasteners consist of not less than 2 No. 8 wood screws at each point, penetrating not less than 32 mm (1 1/4") into solid wood.

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9.8.8. Guards

Article 9.8.8.1. Required Guards

(See Note A-9.8.8.1.)

A-9.8.8.1. Required Guards. The requirements relating to guards stated in Part 9 are based on the premise that, wherever there is a difference in elevation of 600 mm (24") or more between two floors, or between a floor or other surface to which access is provided for other than maintenance purposes and the next lower surface, the risk of injury in a fall from the higher surface is sufficient to warrant the installation of some kind of barrier to reduce the chances of such a fall. A wall along the edge of the higher surface will obviously prevent such a fall, provided the wall is sufficiently strong that a person cannot fall through it. Where there is no wall, a guard must be installed. Because guards clearly provide less protection than walls, additional requirements apply to guards to ensure that a minimum level of protection is provided. These relate to the characteristics described in Notes A-9.8.8.3., A-9.8.8.5.(1) and (2), A-9.8.8.5.(3) and A-9.8.8.6.(1).

Examples of such surfaces where the difference in elevation could exceed 600 mm (24") and consequently where guards would be required include, but are not limited to, landings, porches, balconies, mezzanines, galleries, and raised walkways. Especially in exterior settings, surfaces adjacent to walking surfaces, stairs or ramps often are not parallel to the walking surface or the surface of the treads or ramps. Consequently, the walking surface, stair or ramp may need protection in some locations but not in others. (See Figure A-9.8.8.1.) In some instances, grades are artificially raised close to walking surfaces, stairs or ramps to avoid installing guards. This provides little or no protection for the users. That is why the requirements specify differences in elevation not only immediately adjacent to the construction but also for a distance of 1 200 mm (48") from it by requiring that the slope of the ground be within certain limits. (See Figure A-9.8.8.1.)

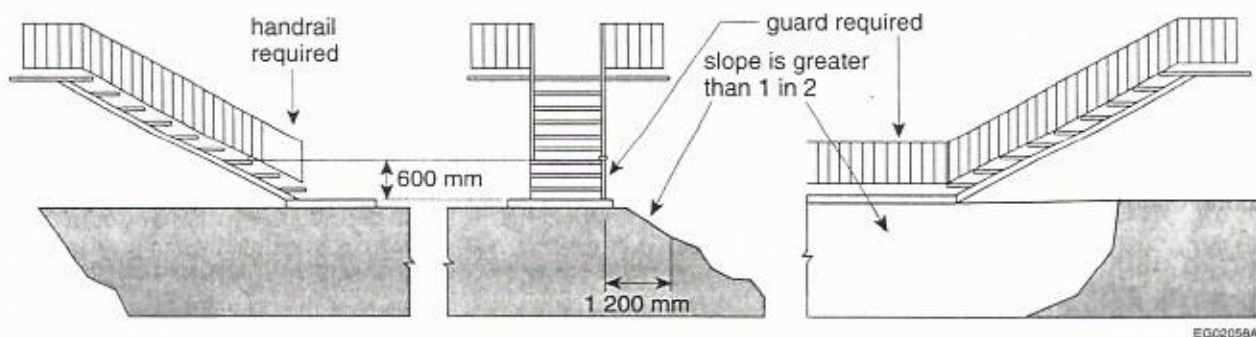


Figure A-9.8.8.1.
Required locations of guards

- 1) Except as provided in Sentence (2), every surface to which access is provided, including but not limited to *flights* of steps and ramps, exterior landings, porches, balconies, *mezzanines*, galleries and raised *walkways*, shall be protected by a *guard* on each side that is not protected by a wall for the length where
- a) there is a difference in elevation of more than 600 mm (24") between the walking surface and the adjacent surface, or
 - b) the adjacent surface within 1.2 m (4') of the walking surface has a slope of more than 1 in 2.



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- 2) *Guards* are not required
 - a) at loading docks,
 - b) at floor pits in *repair garages*, or
 - c) where access is provided for maintenance purposes only.

- 3) Doors in *buildings of residential occupancy*, where the finished floor on one side of the door is more than 600 mm (24") above the floor or other constructed surface or ground level on the other side of the door, shall be protected by
 - a) a *guard*, or
 - b) a mechanism capable of controlling the free swinging or sliding of the door so as to limit any clear unobstructed opening to not more than 100 mm (3 7/8").

- 4) Except as provided in Sentence (5), openable windows in *buildings of residential occupancy* shall be protected by
 - a) a *guard*, or
 - b) a mechanism capable of controlling the free swinging or sliding of the openable part of the window so as to limit any clear unobstructed opening to not more than 100 mm (3 7/8") measured either vertically or horizontally where the other dimension is greater than 380 mm (15") .
(See Note A-9.8.8.1.(4).)

A-9.8.8.1.(4) Height of Window Sills above Floors or Ground. The primary intent of the requirement is to minimize the likelihood of small children falling significant heights from open windows. Reflecting reported cases, the requirement applies only to dwelling units and generally those located on the second floor or higher of residential or mixed use buildings where the windows are essentially free-swinging or free-sliding.

Free-swinging or free-sliding means that a window that has been cracked open can be opened further by simply pushing on the openable part of the window. Care must be taken in selecting windows, as some with special operating hardware can still be opened further by simply pushing on the window.

Casement windows with crank operators would be considered to conform to Clause (4)(b). To provide additional safety, where slightly older children are involved, occupants can easily remove the crank handles from these windows. Awning windows with scissor hardware, however, may not keep the window from swinging open once it is unlatched. Hopper windows would be affected only if an opening is created at the bottom as well as at the top of the window. The requirement will impact primarily on the use of sliding windows which do not incorporate devices in their construction that can be used to limit the openable area of the window.

The 100 mm (3 7/8") opening limit is consistent with widths of openings that small children can fall through. It is only invoked, however, where the other dimension of the opening is more than 380 mm (15"). Again, care must be taken in selecting a window. At some position, scissor hardware on an awning window may break up the open area such that there is no unobstructed opening with dimensions greater than 380 mm (15") and 100 mm (3 7/8"). At another position, however, though the window is not open much more, the hardware may not adequately break up the opening. The 450 mm (18") height off the floor recognizes that furniture is often placed under windows and small children are often good climbers.

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5) Windows need not be protected in accordance with Sentence (4), where

- a) the window serves a *dwelling unit* that is not located above another *suite*,
- b) the window serves a house with a *secondary suite*,
- c) the only opening greater than 100 mm (3 7/8") by 380 mm (15") is a horizontal opening at the top of the window,
- d) the window sill is located more than 450 mm (18") above the finished floor on one side of the window, or
- e) the window is located in a room or space with the finished floor described in Clause (d) located less than 1 800 mm (6') above the floor or ground on the other side of the window.

(See Note A-9.8.8.1.(4).)

6) Except as provided in Sentence (7), glazing installed over *stairs*, ramps and landings that extends to less than 1 070 mm (42") above the surface of the treads, ramp or landing shall be

- a) protected by *guards*, in accordance with this Subsection, or
- b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.14.

7) In *dwelling units*, glazing installed over *stairs*, ramps and landings that extends to less than 900 mm (36") above the surface of the treads, ramp or landing shall be

- a) protected by *guards*, in accordance with this Subsection, or
- b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.14.

8) Glazing installed in public areas that extends to less than 1 m from the floor and is located above the second *storey* in *buildings of residential occupancy* shall be

- a) protected by *guards* in accordance with this Subsection, or
- b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.14.

9.8.8.2. Loads on Guards

(See Note A-9.8.8.2.)

A-9.8.8.2. Loads on Guards. Guards must be constructed so as to be strong enough to protect persons from falling under normal use. Many guards installed in dwelling units or on exterior stairs serving one or two dwelling units have demonstrated acceptable performance over time. The loading described in the first row of Table 9.8.8.2. is intended to be consistent with the performance provided by these guards. Examples of guard construction presented in the "2012 Building Code Compendium, Volume 2, Supplementary Standard SB-7, Guards for Housing and Small Buildings" meet the criteria set in the National Building Code for loads on guards, including the more stringent requirements of Sentences 9.8.8.2.(1) and (2).

The load on guards within dwelling units, or on exterior guards serving not more than two dwelling units, is to be imposed over an area of the guard such that, where standard balusters are used and installed at the maximum 100 mm (3 7/8") spacing permitted for required guards, 3 balusters will be engaged. Where the balusters are wider, only two may be engaged unless they are spaced closer together. Where the guard is not required, and balusters are installed more than 100 mm (3 7/8") apart, fewer balusters may be required to carry the imposed load.

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1) Except as provided in Sentences (2) and (4), *guards* shall be designed to resist the specified loads prescribed in Table 9.8.8.2.

Table 9.8.8.2.
Specified Loads for Guards
Forming Part of Sentence 9.8.8.2.(1)

Location of <i>Guard</i>	Minimum Specified Loads		
	Horizontal Load Applied Inward or Outward at any Point at the Minimum Required Height of the <i>Guard</i>	Horizontal Load Applied Outward on Elements Within the <i>Guard</i> , Including Solid Panels and Balusters	Evenly Distributed Vertical Load Applied at the Top of the <i>Guard</i>
<i>Guards</i> within <i>dwelling units</i> and exterior <i>guards</i> serving not more than 2 <i>dwelling units</i>	0.5 kN/m OR concentrated load of 1.0 kN applied at any point ⁽¹⁾	0.5 kN applied over a maximum width of 300 mm and a height of 300 mm ⁽²⁾	1.5 kN/m
<i>Guards</i> serving access ways to equipment platforms and similar areas where the gathering of many people is improbable	Concentrated load of 1.0 kN applied at any point	Concentrated load of 0.5 kN applied over an area of 100 mm by 100 mm located at any point on the element or elements so as to produce the most critical effect	1.5 kN/m
All other <i>guards</i>	0.75 kN/m OR concentrated load of 1.0 kN applied at any point ⁽¹⁾	Concentrated load of 0.5 kN applied over an area of 100 mm by 100 mm located at any point on the element or elements so as to produce the most critical effect	1.5 kN/m

Notes to Table 9.8.8.2.:

- (1) The load that creates the most critical condition shall apply.
(2) See Sentence (2).

2) For *guards* within *dwelling units* and within houses with a *secondary suite* including their common spaces and for exterior *guards* serving not more than 2 *dwelling units*, where the width and spacing of balusters are such that 3 balusters can be engaged by a load imposed over a 300 mm (12") width, the load shall be imposed so as to engage 3 balusters.

3) None of the loads specified in Table 9.8.8.2. need be considered to act simultaneously.

4) For *guards* within *dwelling units* and within houses with a *secondary suite* including their common spaces and for exterior *guards* serving not more than 2 *dwelling units*, Table 9.8.8.2. need not apply where the *guard* construction used has been demonstrated to provide effective performance.

Article 9.8.8.3. Height of Guards

(See Note A-9.8.8.3.)

A-9.8.8.3. Minimum Heights. Guard heights are generally based on the waist heights of average persons. Generally, lower heights are permitted in *dwelling units* because the occupants become familiar with the potential hazards, and situations which lead to pushing and jostling under crowded conditions are less likely to arise.



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- 1) Except as provided in Sentences (2) to (4), all *guards* shall be not less than 1 070 mm (42") high.
- 2) All *guards* within *dwelling units* or within houses with a *secondary suite* including their common spaces shall be not less than 900 mm (36") high.
- 3) Exterior *guards* serving not more than one *dwelling unit* or a house with a *secondary suite* including their common spaces shall be not less than 900 mm (36") high where the walking surface served by the *guard* is not more than 1 800 mm (6') above the finished ground level.
- 4) *Guards* for *flights* of steps, except in required *exit* stairs, shall be not less than 900 mm (36") high.
- 5) The height of *guards* for *flights* of steps shall be measured vertically from the top of the *guard* to a line drawn through the tread nosing served by the *guard*.

Article 9.8.8.4. Guards for Floors and Ramps in Garages

- 1) Except for floors of garages referred to in Section 9.35., where garage floors or ramps are 600 mm (24") or more above the adjacent ground or floor level, every opening through a garage floor and the perimeter of floors and ramps that have no exterior walls shall be provided with
 - a) a continuous curb not less than 140 mm (5.5") in height, and
 - b) a *guard* not less than 1 070 mm (42") above the floor level.
- 2) Vehicle guardrails shall be designed and constructed to withstand the loading values stipulated in Sentence 4.1.5.15.(1). (See Note A-4.1.5.14. and 4.1.5.15.(1).)

Article 9.8.8.5. Openings in Guards

- 1) Except as permitted in Sentences (2) and (3), openings through *guards* shall be of a size that prevents the passage of a spherical object having a diameter of 100 mm (3 7/8").
(See Note A-9.8.8.5.(1) and (2).)

A-9.8.8.5.(1) and (2) Risk of Falling through Guards. The risk of falling through a guard is especially prevalent for children. Therefore the requirements are stringent for guards in all buildings except industrial buildings, where children are unlikely to be present except under strict supervision.

- 2) Except where they serve *storage garages*, *guards* in *industrial occupancies* are permitted to consist of
 - a) a top railing, and
 - b) one or more horizontal intermediate rails spaced such that the size of the openings through the *guard* prevents the passage of a spherical object having a diameter of 535 mm (21").
(See Note A-9.8.8.5.(1) and (2).)

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3) Openings through any *guard* that is not required by Article 9.8.8.1. and that serves an *occupancy* other than an *industrial occupancy* shall be of a size that

- a) prevents the passage of a spherical object having a diameter of 100 mm (3 7/8"), or
- b) permits the passage of a spherical object having a diameter of 200 mm (8").

(See Note A-9.8.8.5.(3).)

A-9.8.8.5.(3) Risk of Children Getting Their Head Stuck between Balusters. The requirements to prevent children falling through guards also serve to provide adequate protection against this problem. However, guards are often installed where they are not required by the Code; i.e., in places where the difference in elevation is less than 600 mm (24"). In these cases, there is no need to require the openings between balusters to be less than 100 mm (3 7/8"). However, there is a range of openings between 100 mm (3 7/8") and 200 mm (8") in which children can get their head stuck. Therefore, openings in this range are not permitted except in buildings of industrial occupancy, where children are unlikely to be present except under strict supervision.

Article 9.8.8.6. Design of Guards to Not Facilitate Climbing

1) Except for *guards* in *industrial occupancies*, *guards* required by Article 9.8.8.1. that protect a level located more than 4.2 m (13'-9") above the adjacent level shall be designed so that no member, attachment or opening located between 140 mm (5.5") and 900 mm (36") above the level protected by the *guard* facilitates climbing. (See Note A-9.8.8.6.(1).)

A-9.8.8.6.(1) Configuration of Members, Attachments or Openings in Guards so as to not Facilitate Climbing. Some configurations of members, attachments or openings may be part of a guard design and still comply with Sentence 9.8.8.6.(1). Figures A-9.8.8.6.(1)-A to A-9.8.8.6.(1)-D present a few examples of designs that are considered to not facilitate climbing.

Protrusions that are greater than 450 mm (18") apart horizontally and vertically are considered sufficiently far apart to reduce the likelihood that young children will be able to get a handhold or toehold on the protrusions and climb the guard.

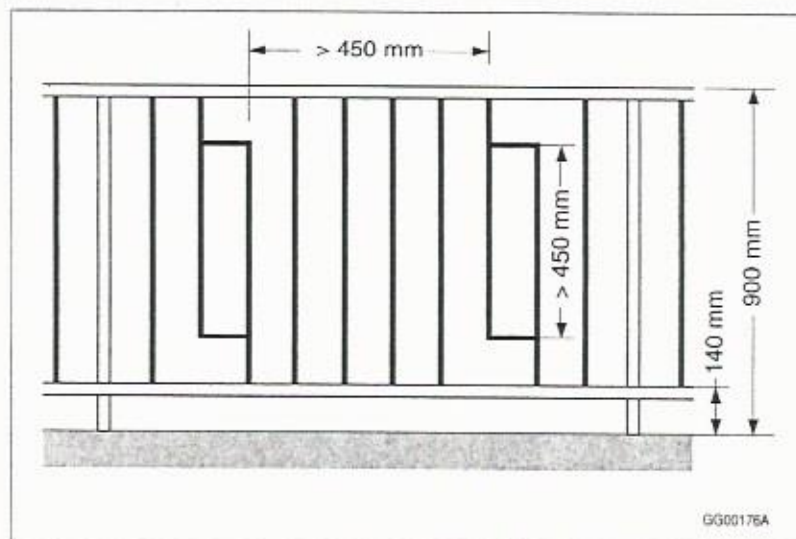
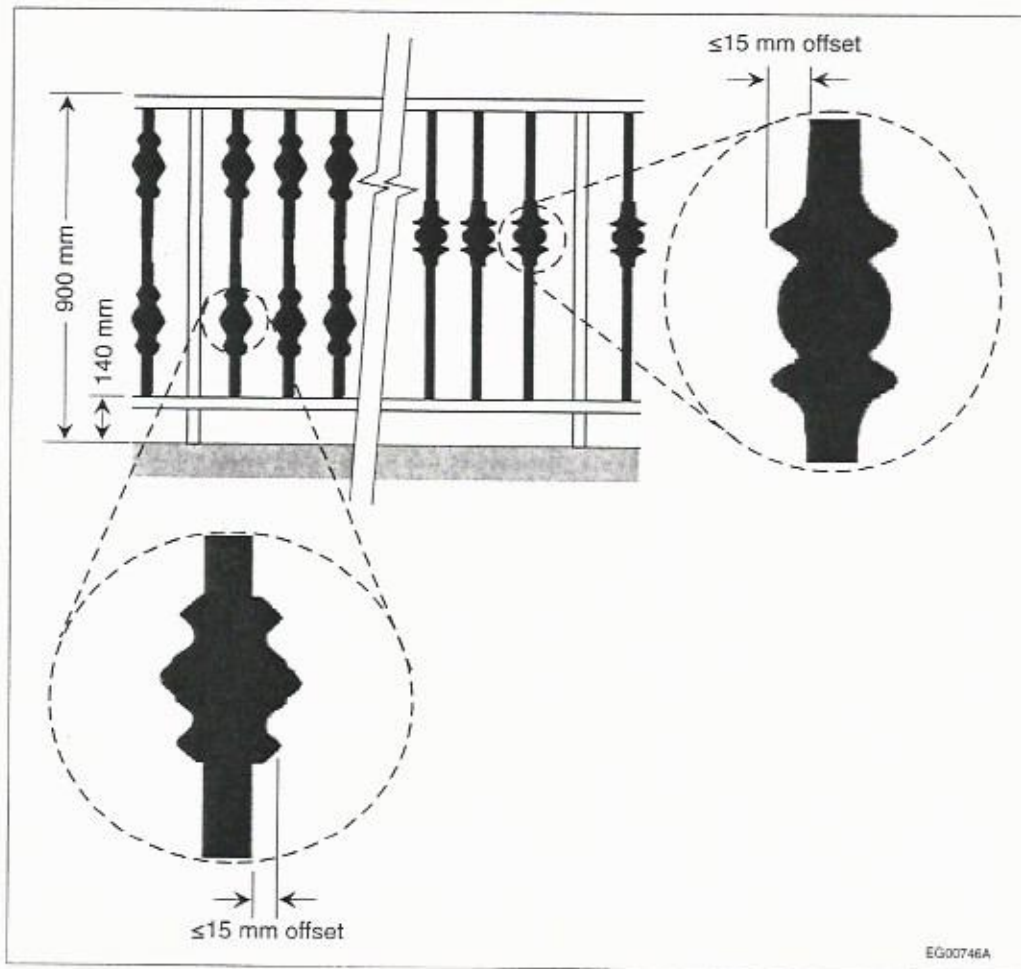


Figure A-9.8.8.6.(1)-A
Example of minimum horizontal and vertical clearances between protrusions in guards

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Protrusions that present a horizontal offset of 15 mm (1/2") or less are considered to not provide a sufficient foot purchase to facilitate climbing.



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Figure A-9.8.8.6.(1)-B
Examples of maximum horizontal offset of protrusions in guards

A guard incorporating spaces that are not more than 45 mm (1 3/4") wide by 20 mm (3/4") high is considered to not facilitate climbing because the spaces are too small to provide a foothold.

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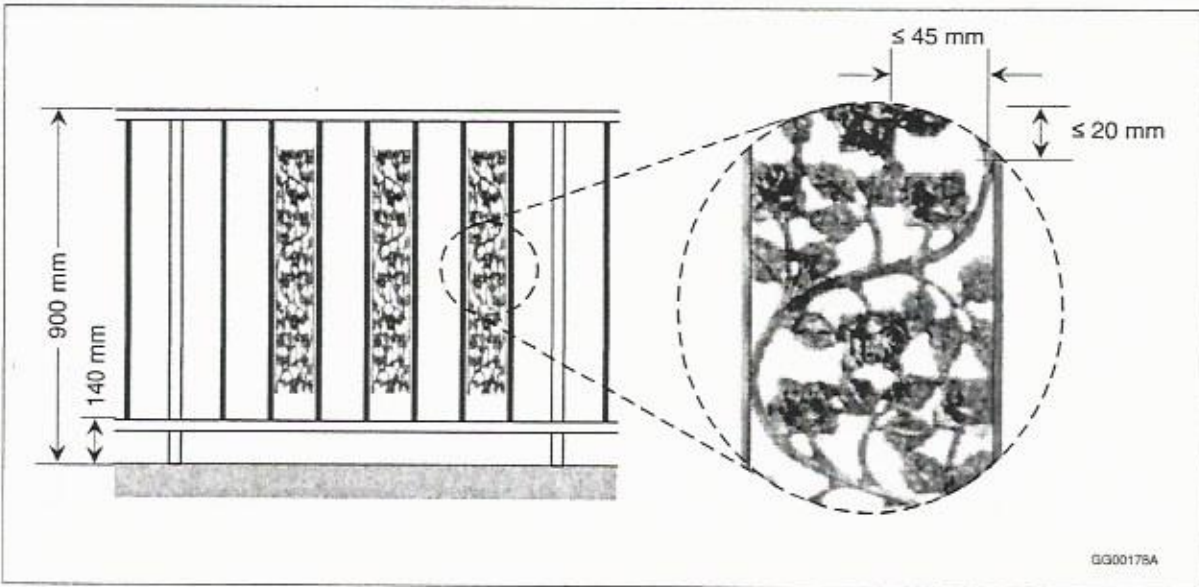


Figure A-9.8.8.6.(1)-C
Example of a guard with spaces created by the protruding elements that are not more than 45 mm (1 ¾”) wide and 20 mm (¾”) high

Protrusions that present more than a 2-in-1 slope on the offset are considered to not facilitate climbing because such a slope is considered too steep to provide adequate footing.

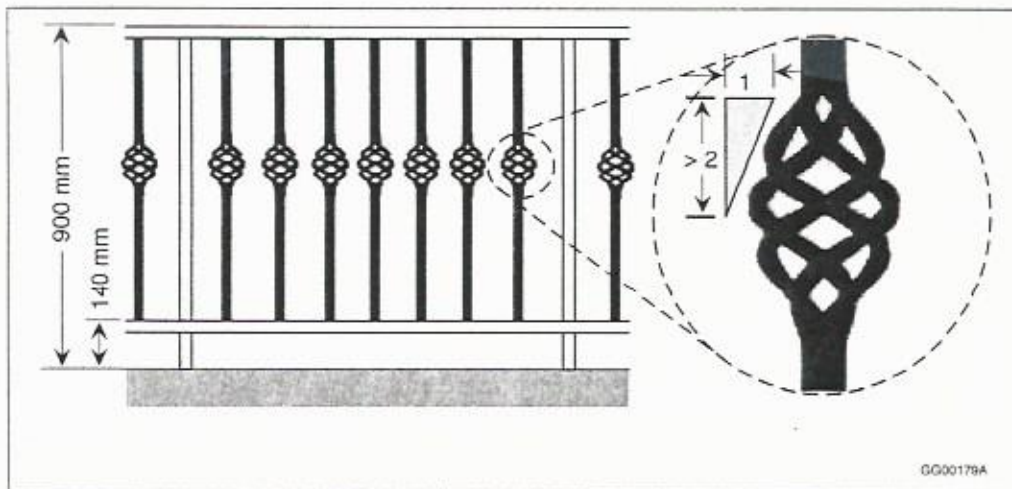
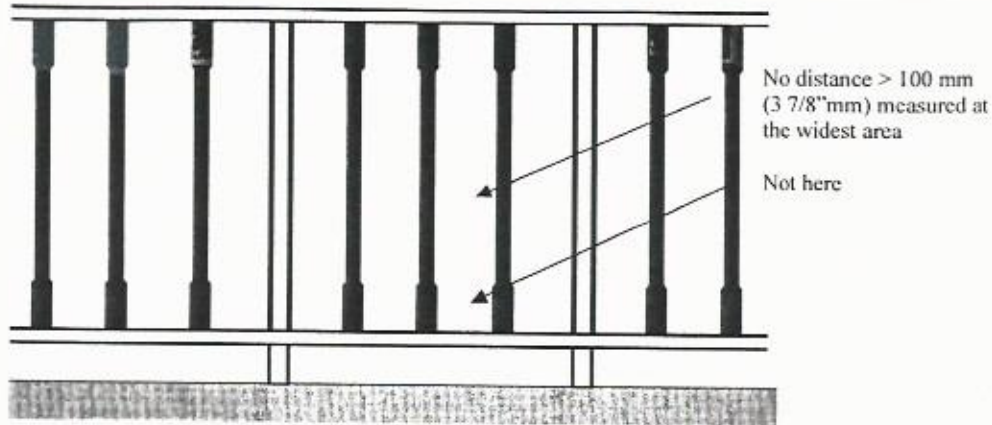


Figure A-9.8.8.6.(1)-D
Example of guard protrusions with a slope greater than 2 in 1

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Article 9.8.8.7. Glass in Guards

- 1) Glass in *guards* shall be
 - a) safety glass of the laminated or tempered type conforming to CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass," or
 - b) wired glass conforming to CAN/CGSB-12.11-M, "Wired Safety Glass."

In Summary

This Advisory #2 includes a summary of the applicable Part 9, 2015 NBC provisions for the construction of Stairs, Barrier-Free Ramps, Handrails, and Guards for all Part 9 buildings.

For the construction of Stairs, Barrier-Free Ramps, Handrails and Guards in all buildings that are governed under Part 3 of the 2015 NBC, please see Advisory #3 as it deals with the construction of Stairs, Barrier-Free Ramps, Handrails and Guards in all buildings that are governed under Part 3 of the 2015 NBC.

For the construction of stairs, handrails and guards for single family dwellings or a house with a secondary suite only, please consult Advisory #1 as it deals with the construction of stairs, handrails and guards for single family dwellings or a house with a secondary suite.