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Proposed Change 1772

Code Reference(s):	NBC20 Div.B 3.4.6.5. (first printing)
Subject:	Other — Use and Egress
Title:	Minimum Width of Stairs or Ramps Between Handrails
Description:	This proposed change clarifies the minimum width of stairs or ramps where an intermediate handrail is required.
Related Code Change Request(s):	CCR 1546

This change could potentially affect the following topic areas:

- | | |
|--|---|
| <input type="checkbox"/> Division A | <input checked="" type="checkbox"/> Division B |
| <input type="checkbox"/> Division C | <input checked="" type="checkbox"/> Design and Construction |
| <input type="checkbox"/> Building operations | <input type="checkbox"/> Housing |
| <input checked="" type="checkbox"/> Small Buildings | <input checked="" type="checkbox"/> Large Buildings |
| <input type="checkbox"/> Fire Protection | <input checked="" type="checkbox"/> Occupant safety in use |
| <input checked="" type="checkbox"/> Accessibility | <input type="checkbox"/> Structural Requirements |
| <input type="checkbox"/> Building Envelope | <input type="checkbox"/> Energy Efficiency |
| <input type="checkbox"/> Heating, Ventilating and Air Conditioning | <input type="checkbox"/> Plumbing |
| | <input type="checkbox"/> Construction and Demolition Sites |

Problem

Sentence 3.4.6.5.(3) of Division B of the NBC provides requirements for intermediate handrails where stairs or ramps are too wide to readily reach one of the handrails on the outer edges of the stair or ramp.

Clause 3.4.6.5.(3)(b) is worded such that for stairs or ramps that require an intermediate handrail, one portion of the stair or ramp must have the minimum width required. As it is written, this provision could be interpreted to mean that the dimension (1 100 mm in many cases) must be the exact minimum width. The 1 100 mm width allows for two people to use the stairs or ramp side by side. Clause 3.4.6.5.(3)(c) indicates that other portions of stairs or ramps must have a clear width of at least 510 mm between handrails, leaving room for wider portions of stair or ramp, if desired. These portions are intended to be wide enough to allow at least one person to use the stairs. The intent for both requirements is to provide minimum dimensions to serve in emergency situations where people are likely to circulate only in one direction.

It is intended that the portion of stair or ramp having the minimum width required also be “at least” this wide, while also having handrails within reach as required by Clause 3.4.6.5.(3)(a). However, the Code language does not currently reflect this intent.

Additionally, there is confusion where the Code uses different terms such as “minimum width” and “clear width”, especially in the same Sentence. Some Code users may interpret these terms as having the same meaning, while others do not. This could lead to different levels of performance in exit facility design, which may not be sufficient to facilitate a timely evacuation as originally intended by the Code. For clarity and ease of design and enforcement, this proposed change clarifies the terms used in this Sentence by introducing an explanatory Note and related figures.

Justification

The dimensions of portions of stairs or ramps were previously reviewed and given due consideration. It is acknowledged that some stair or ramp widths might not comply with the existing requirements (for example, for stairs that are 1 400 mm wide, a portion of 1 100 mm plus a minimum of 510 mm for the other portion is not possible). However, this would be the case regardless of the minimum dimension (510 mm or another number).

This proposed change revises Clause 3.4.6.5.(3)(b) to reflect the Code intent to require a portion of stairs or a ramp to be “at least” the minimum width required and clarify how the width should be measured.

This proposed change also introduces explanatory Note A-3.4.6.5.(3) to clarify where the intermediate handrail is required by Sentence 3.4.6.5.(3) and how to measure the relevant dimensions. Additionally, two figures are provided to illustrate where an intermediate handrail is not required and where a handrail is required.

The proposed change clarifies the existing provisions to avoid misinterpretation and for consistent application by designers, builders and building officials.

PROPOSED CHANGE

[3.4.6.5.] 3.4.6.5. Handrails

- [1] 1)** One handrail shall be provided on stairs that are less than 1 100 mm in width.
- [2] 2)** One handrail shall be provided on each side of
 - [a] a) stairs that are 1 100 mm or more in width,
 - [b] b) curved *flights* of any width, and
 - [c] c) *ramps*.
- [3] 3)** In addition to Sentence (2), intermediate handrails shall be provided so that

- [a] a) a handrail is reachable within 750 mm of all portions of the required *exit* width,
 - [b] b) at least one portion of the stair or *ramp* ~~between two handrails is~~ has at least the minimum width required for stairways or *ramps* (see Sentences 3.4.3.2.(8) and 3.4.3.3.(4)), and
 - [c] c) all other portions of the stair or *ramp* between two handrails have a clear width of at least 510 mm ~~or more~~.
(See Note A-3.4.6.5.(3).)
- [4] 4)** Where a stair or *ramp* is wider than its required *exit* width, handrails shall be located along the most direct path of travel. (See Note A-3.4.6.5.(4).)
- [5] 5)** Handrails shall be continuously graspable along their entire length, be free of any sharp or abrasive elements, and have
- [a] a) a circular cross-section with an outside diameter not less than 30 mm and not more than 50 mm, or
 - [b] b) a non-circular cross-section with a perimeter not less than 100 mm and not more than 160 mm and whose largest cross-sectional dimension is not more than 57 mm.
- [6] 6)** The height of handrails on stairs, on aisles with steps and on *ramps* shall be measured vertically from the top of the handrail to
- [a] a) a straight line drawn tangent to the tread nosings of the stair or aisle step served by the handrail (see Note A-9.8.7.4.), or
 - [b] b) the surface of the *ramp*, floor or landing served by the handrail.
- [7] 7)** Except as provided in Sentence (8) and Clause 3.8.3.5.(1)(e), the height of handrails on stairs, on aisles with steps and on *ramps* shall be
- [a] a) not less than 865 mm, and
 - [b] b) not more than 1 070 mm.
- [8] 8)** Handrails installed in addition to required handrails need not comply with Sentence (7).
- [9] 9)** Required handrails shall be continuously graspable throughout the length of
- [a] a) a *ramp*, and
 - [b] b) a *flight* of stairs, from the bottom riser to the top riser.
(See Note A-9.8.7.2.)
- [10] 10)** Except where interrupted by doorways, at least one handrail shall be continuous throughout the length of a stairway or *ramp*, including at landings.
- [11] 11)** Handrails shall be terminated in a manner that will not obstruct pedestrian travel or create a hazard. (See Note A-3.4.6.5.(11)).
- [12] 12)** At least one handrail at the side of a stairway or *ramp* shall extend horizontally not less than 300 mm beyond the top and bottom of the stairway or *ramp*.
- [13] 13)** The clearance between a handrail and any surface behind it shall be not less than

- [a] a) 50 mm, or
- [b] b) 60 mm if the surface behind the handrail is rough or abrasive.

[14] 14) Handrails and their supports shall be designed and constructed to withstand the loading values specified in Sentence 4.1.5.14.(7).

[15] 15) A *ramp* shall have handrails on both sides.

Note A-3.4.6.5.(3) Intermediate Handrails.

Clause 3.4.6.5.(3)(a) establishes that a handrail must be provided within arm's reach (750 mm) of any location in the portion of a stair or ramp that contains the required exit width, in order to mitigate the risk of injury due to missteps and falls. This 750 mm distance should be measured to the nearest edge of the handrail.

Where a stair or ramp is too wide for this reaching distance to be satisfied with handrails at the sides of the stair or ramp, an intermediate handrail is required. Clause 3.4.6.5.(3)(b) establishes that an intermediate handrail must be provided so that at least one portion of the stair or ramp has at least the minimum width required for stairs and ramps (often 1 100 mm) in order to accommodate the flow of two lines of occupants in an emergency.

Clause 3.4.6.5.(3)(c) establishes that all other portions of a stair or ramp must have a clear width between handrails of at least 510 mm.

Designers should consider the function served by a stair or ramp in the building's design. Where a stair or ramp is intended to serve people travelling in both directions in normal building use, widths larger than those prescribed by Sentence 3.4.6.5.(3) should be considered.

Figure [A-3.4.6.5.(3)-A]
Stair where an intermediate handrail is not required by Clause 3.4.6.5.(3)(a)

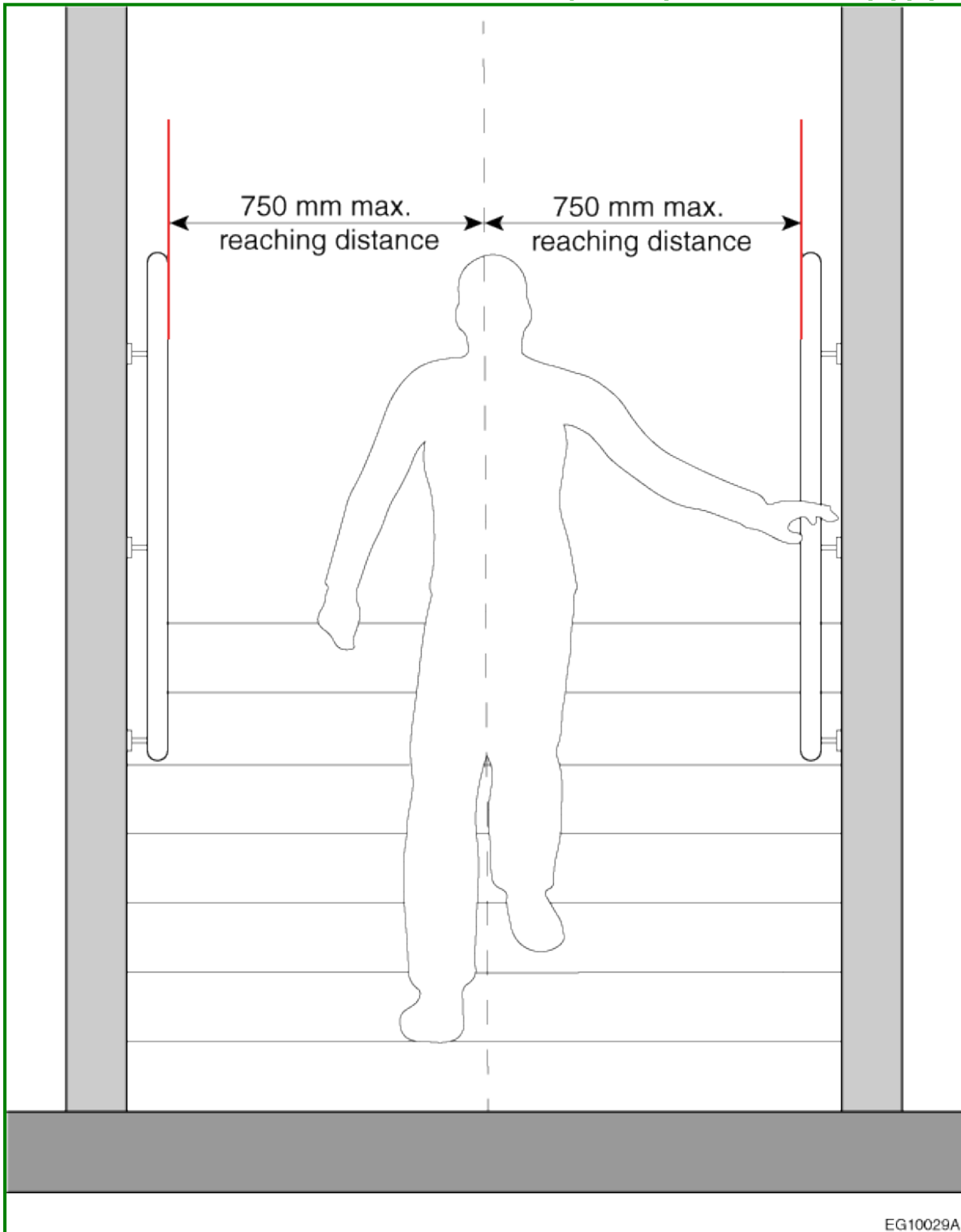
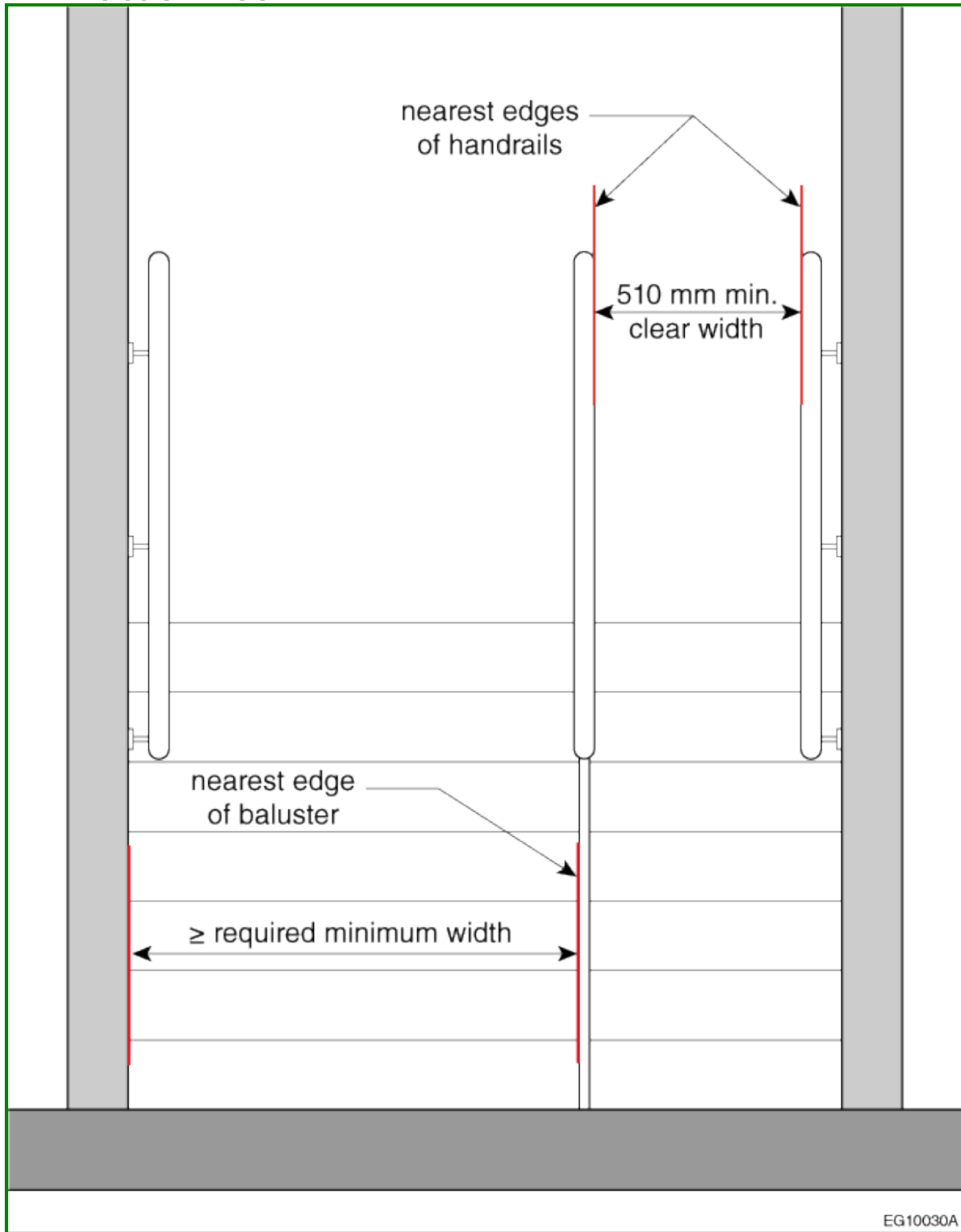


Figure [A-3.4.6.5.(3)-B]
Stair where an intermediate handrail is provided in accordance with Clauses 3.4.6.5.(3)(b) and (c)



Impact analysis

As the proposed change clarifies the existing provisions, no increased cost is associated with it. Unnecessary costs associated with redesign or rework can be minimized by clarifying the current Code provisions. The clarification would provide guidance for designers and building officials so that the design of stairs and ramps can permit the efficient evacuation of people, as well as consider normal daily traffic on the stairs and ramps.

Depending on how the Clause 3.4.6.5.3.(b) was previously interpreted, the addition of “at least” would not have a particular impact. However, where it was interpreted to mean that a portion of stairs or ramps was required to match the exact exit width (for example, exactly 1 100 mm), the proposed change would provide additional flexibility in stair or ramp design, while still maintaining the level of safety (handrails within reach from any location in that portion of stair or ramp).

Enforcement implications

The proposed change makes consistent use of the term “minimum width”, which would allow ease of design and enforcement in the field. The width at shoulder height of the average person is considered to be the more critical measure for egress purposes than “clear width” between handrails.

The clarification provided in the proposed change should facilitate the more consistent application of the requirements. Stair and ramp widths can be measured using existing methods and basic measurement tools.

Who is affected

The proposed change clarifies the existing provisions for building designers and authorities having jurisdiction so that the provisions can be interpreted consistently.

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

[\[3.4.6.5.\]](#) 3.4.6.5. ([1] 1) [F10-OS3.7] [F30-OS3.1]

[\[3.4.6.5.\]](#) 3.4.6.5. ([2] 2) [F10-OS3.7] [F30-OS3.1]

[\[3.4.6.5.\]](#) 3.4.6.5. ([3] 3) [F10-OS3.7] [F30-OS3.1]

[\[3.4.6.5.\]](#) 3.4.6.5. ([4] 4) [F10-OS3.7] [F30-OS3.1]

[3.4.6.5.] 3.4.6.5. ([5] 5) [F30-OS3.1] [F10-OS3.7]

[3.4.6.5.] 3.4.6.5. ([6] 6) no attributions

[3.4.6.5.] 3.4.6.5. ([7] 7) [F30-OS3.1] [F10-OS3.7]

[3.4.6.5.] 3.4.6.5. ([8] 8) no attributions

[3.4.6.5.] 3.4.6.5. ([9] 9) [F10-OS3.7] [F30-OS3.1]

[3.4.6.5.] 3.4.6.5. ([10] 10) [F30-OS3.1] [F10-OS3.7]

[3.4.6.5.] 3.4.6.5. ([10] 10) [F73-OA1]

[3.4.6.5.] 3.4.6.5. ([11] 11) [F30-OS3.1] [F10-OS3.7]

[3.4.6.5.] 3.4.6.5. ([12] 12) [F30-OS3.1] [F10-OS3.7]

[3.4.6.5.] 3.4.6.5. ([12] 12) [F73-OA1]

[3.4.6.5.] 3.4.6.5. ([13] 13) [F30-OS3.1] [F10-OS3.7]

[3.4.6.5.] 3.4.6.5. ([14] 14) no attributions

[3.4.6.5.] 3.4.6.5. ([15] 15) [F30-OS3.1] [F10-OS3.7]