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Proposed Change 1767

Code Reference(s):	NBC20 Div.B 9.8.5.4. (first printing)
Subject:	Accessibility — Anthropometrics
Title:	Slope of Ramps Not Located in Barrier-Free Paths of Travel
Description:	This proposed change modifies the maximum allowable slope of ramps not located in barrier-free paths of travel so they are safer to use.
Related Proposed Change(s):	PCF 1503

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 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

Ramps that are steeper than 1 in 12 are unsafe for many people and should not be allowed in access to exits, as they could impede the safe movement of people in the event of an emergency or in everyday use or navigation of the building. In the 2020 edition of the National Building Code of Canada (NBC), Part 3 was updated to limit ramp slopes to 1 in 12 unless the ramps are in industrial occupancies or in aisles of assembly occupancies. Part 9 has not yet been updated to reflect this change. This lack of consistency could lead to safety issues for people navigating ramps in Part 9 buildings if they expect gentler slopes as they would have in a Part 3 building.

Justification

A slope of 1 in 12 was

- identified through a cross-jurisdictional scan by the National Research Council of Canada as the minimum standard for ramps, and
- determined to be the international best practice in universal design.

People with low-level quadriplegia, older adults, people with low stamina, people with multiple disabilities (e.g., multiple sclerosis, amyotrophic lateral sclerosis, Parkinson's disease, cerebral palsy, low vision or balance issues) and other people with mobility impairments have difficulty climbing steeper slopes. People who wear prosthetic feet or foot orthotics that do not bend can also experience difficulty with steeper slopes, to the point of having to use the stairs if their orthotics do not bend at all, for example. The transition from a flat surface to a steep slope can cause foot plates or anti-tip bars to jam.

To provide safer ramps for building users of all abilities, this proposed change would limit the maximum slope of ramps in access to exits, except those in industrial occupancies, to 1 in 12. An exception would be provided for ramps serving dwelling units, as a gentler slope may be difficult to achieve on smaller lots due to space limitations. In such cases, the requirement would remain the same as in the NBC 2020.

Slope requirements for ramps not in barrier-free paths of travel were modified in Part 3 of the NBC ahead of the publication of the 2020 Codes. However, Part 9 requirements were not updated at the same time. This proposed change would therefore harmonize ramp slope requirements between the two Parts and ensure that occupants of Part 9 buildings receive the level of safety already required in Part 3 buildings.

PROPOSED CHANGE

[9.8.5.4.] 9.8.5.4. Ramp Slope

- [1] 1) Except as provided in Section 3.8, The slope of ramps shall have a slope that is uniform along their length and be not more than
- [a] a) ~~1 in 10 for exterior ramps,~~
 - [b] b) 1 in 10 for interior and exterior ramps serving ~~residential occupancies~~ dwelling units,
 - [c] c) 1 in 6 for interior ramps and 1 in 10 for exterior ramps serving industrial occupancies, and
 - [d] d) 1 in ~~12~~ 8 for interior and exterior ramps serving all other occupancies.

Impact analysis

The proposed change would reduce the maximum allowable ramp slope in most occupancies (i.e., other than industrial occupancies and dwelling units), thereby enabling people to use ramps more safely. For designs already using slopes of 1 in 12

or less, the proposed change would not create additional costs. For example, the slopes of ramps in barrier-free paths of travel are already limited to not more than 1 in 12 by Sentence 3.8.3.5.(1).

In areas where slopes steeper than 1 in 12 are currently permitted, the proposed change could result in more square footage being used to build ramps. Additional materials may also be required for the added ramp length and longer handrails. A relaxation for dwelling units that would maintain the requirement in the NBC 2020 is included in the proposed change, as residential building lots may have insufficient space to allow for longer ramps.

For example, for an exterior ramp that is not required to provide a barrier-free path of travel, the maximum slope would be reduced from 1 in 10 to 1 in 12. For a rise of 1 m, the new requirements would add 2 m in length (or about 1.8 m², if the ramp is 900 mm wide) to the 9 m² already used by a ramp conforming to the existing requirements. Cost data provided by RSMeans estimates that cast concrete access ramps with handrails cost around \$2,700 per linear metre for a 900 mm wide ramp, while aluminum or steel ramps with handrails cost approximately \$1,230 to \$1,400 per linear metre.

A 1 m rise is substantial for any ramp, however, and in some cases, a mechanical lift may be safer, easier for people to navigate, more economical and less square footage intensive than a ramp. According to cost data published by RSMeans, the estimated cost for a lift ranges from \$10,800 to \$25,500, roughly, depending on its features (i.e., residential, commercial, capacity, range, indoor/outdoor), which is similar to the cost range for a steel ramp of about 9 m. However, it should be noted that a ramp may be more reliable in the case of an emergency (e.g., a power outage) and would require less maintenance than a mechanical lift.

Table 1 summarizes the impact analysis. Note that the cost estimates for the 1 in 10 ramp and 1 in 8 ramp are in relation to the estimates for a 1 in 12 ramp, representing the cost difference between an NBC 2020-compliant ramp and one that would be required by the proposed change.

Table 1. Summary of the Cost Impact and Benefits of Reduced Ramp Slope Maximum

Ramp Compliant With the NBC 2020	Cost Difference to Install 1 in 12 Ramp	Benefits of the Proposed Change
1 in 12 slope, 1 m rise (0.5 m rise)	\$0 (\$0)	It is not always clear whether a path of travel is barrier-free, so having uniform maximum slope requirements for all paths of travel would allow building users to be confident in their expectations of a ramp.
1 in 10 slope, 1 m rise (0.5 m rise)	+\$5,400 (+\$2,700) per ramp	Note A-3.8.3.5.(1)(b), Ramp Slopes, explains that "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." Decreasing the maximum permitted slope from 1 in 10 to 1 in 12 would therefore better align ramp requirements with what is considered manageable.
1 in 8 slope, 1 m rise (0.5 m rise)	+\$10,800 (+\$5,400) per ramp	

Enforcement implications

This proposed change could be enforced by the infrastructure currently in place to enforce the Code, through visual inspection and measurement tools.

Who is affected

Occupants would be able to use ramps more safely.

Designers and builders would need to ensure ramps comply with the requirements.

Building officials would need to evaluate compliance with the requirements.

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

[9.8.5.4.] 9.8.5.4. (**[1]** 1) [F30-OS3.1] [F10-OS3.7]