or portions of work areas, other than raised courtroom stations, that are less than 300 square feet (30 m^2) in area and elevated 7 inches (178 mm) or more above the ground or finish floor where the elevation is essential to the function of the space shall be exempt from all requirements.

1103.2.4 Detached dwellings. Detached one- and two-family *dwellings* and accessory structures, and their associated *sites* and facilities, are not required to be *accessible*.

1103.2.5 Utility buildings. Occupancies in Group U are exempt from the requirements of this chapter other than the following:

1. In agricultural buildings, access is required to paved work areas and areas open to the general public.
2. Private garages or carports that contain required *accessible* parking.

1103.2.6 Construction sites. Structures, *sites* and equipment directly associated with the actual processes of construction including, but not limited to, scaffolding, bridging, materials hoists, materials storage or construction trailers are not required to be *accessible*.

1103.2.7 Raised areas. Raised areas used primarily for purposes of security, life safety or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers or lifeguard stands, are not required to be *accessible* or to be served by an *accessible route*.

1103.2.8 Limited access spaces. Nonoccupiable spaces accessed only by ladders, catwalks, crawl spaces, freight elevators or very narrow passageways are not required to be *accessible*.

1103.2.9 Equipment spaces. Spaces frequented only by personnel for maintenance, repair or monitoring of equipment are not required to be *accessible*. Such spaces include, but are not limited to, elevator pits, elevator *penthouses*, mechanical, electrical or communications equipment rooms, piping or equipment catwalks, water or sewage treatment pump rooms and stations, electric substations and transformer vaults, and highway and tunnel utility facilities.

1103.2.10 Single-occupant structures. Single-occupant structures accessed only by passageways below grade or elevated above grade including, but not limited to, toll booths that are accessed only by underground tunnels, are not required to be *accessible*.

1103.2.11 Residential Group R-1. Buildings of Group R-1 containing not more than five *sleeping units* for rent or hire that are also occupied as the residence of the proprietor are not required to be *accessible*.

1103.2.12 Day care facilities. Where a day care facility (Groups A-3, E, I-4 and R-3) is part of a *dwelling unit*, only the portion of the structure utilized for the day care facility is required to be *accessible*.

1103.2.13 Live/work units. In live/work units constructed in accordance with Section 419, the portion of the unit utilized for nonresidential use is required to be *accessible*. The residential portion of the live/work unit is required to be evaluated separately in accordance with Sections 1107.6.2 and 1107.7.

1103.2.14 Detention and correctional facilities. In detention and correctional facilities, *common use* areas that are used only by inmates or detainees and security personnel, and that do not serve holding cells or housing cells required to be *accessible*, are not required to be *accessible* or to be served by an *accessible route*.

1103.2.15 Walk-in coolers and freezers. Walk-in coolers and freezers intended for employee use only are not required to be *accessible*.

SECTION 1104
ACCESSIBLE ROUTE

1104.1 Site arrival points. *Accessible routes* within the *site* shall be provided from public transportation stops; *accessible* parking; *accessible* passenger loading zones; and public streets or sidewalks to the *accessible* building entrance served. The exterior accessible path of travel shall be fixed, firm, nonslip and a minimum 48 inches (1219 mm) wide. Where handrails are provided, the measurement shall be between the handrails.

Exception: Other than in buildings or facilities containing or serving *Type B units*, an *accessible route* shall not be required between *site* arrival points and the building or facility entrance if the only means of access between them is a vehicular way not providing for pedestrian access.

1104.2 Within a site. At least one *accessible route* shall connect *accessible* buildings, *accessible* facilities, *accessible* elements and *accessible* spaces that are on the same *site*. The exterior accessible path of travel shall be fixed, firm, nonslip and a minimum 48 inches (1219 mm) wide. Where handrails are provided, the measurement shall be between the handrails.

Exception: An *accessible route* is not required between *accessible* buildings, *accessible* facilities, *accessible* elements and *accessible* spaces that have, as the only means of access between them, a vehicular way not providing for pedestrian access.

1104.3 Connected spaces. When a building or portion of a building is required to be *accessible*, an *accessible route* shall be provided to each portion of the building, to *accessible* building entrances connecting *accessible pedestrian walkways* and the public way.

Exceptions:

1. In assembly areas with fixed seating, an *accessible route* shall not be required to serve levels where *wheelchair spaces* are not provided.
2. In Group I-2 facilities, doors to *sleeping units* shall be exempted from the requirements for maneuvering clearance at the room side provided the door is a minimum of 44 inches (1118 mm) in width.

having a switch located near the top of the door that can be used to either turn off power to the door or to an occupant sensing device. These switches are not used in the normal door operation by the building occupants.

405 Ramps

❖ The intent of this section is to address ramps that are part of an accessible route. Ramps that are not part of an accessible route, such as those in portions of assembly seating that are not required to be accessible, may have steeper slopes where permitted by the model codes adopted by the authority having jurisdiction and are not required to comply with the provisions for accessible ramps in this standard.

The model codes also include provisions for guards at drop offs as an issue of safety. These would be applicable to all ramps, including accessible ramps. Although this section does include requirements for edge protection and handrails, this section does not include information on guards. See commentary Figure C405 for an example of a ramp with a required guard.

405.1 General. Ramps along accessible routes shall comply with Section 405.

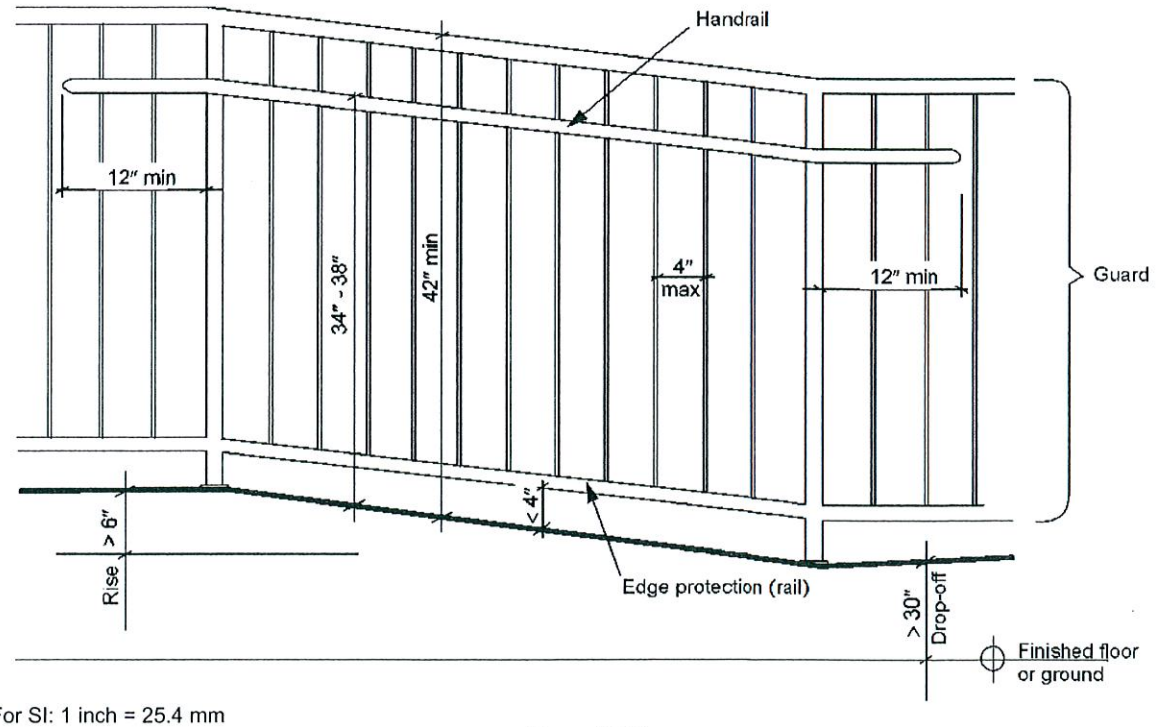
❖ According to the definition for ramps in Section 106.5, a sloped walking surface with a rise of more than 1 inch per 20 inches (1:20) of run is considered a ramp. If elevators or platform lifts are not available to connect different levels, ramps are essential for a person using a wheelchair or scooter.

A gradual slope of 1:20 or less is treated as essentially level. However, many persons who use wheelchairs cannot travel long distances on such a slope. Therefore, even if the sloped walking surface does not qualify as a ramp, level areas should be provided in a path of travel at intervals of not more than 200 feet (61 mm) to provide rest areas (see Section 403.5.2, Passing Space).

405.2 Slope. Ramp runs shall have a running slope not steeper than 1:12.

EXCEPTION: In existing buildings or facilities, ramps shall be permitted to have slopes steeper than 1:12 complying with Table 405.2 where such slopes are necessary due to space limitations.

❖ The ability to manage an incline is related to both its slope and its length. Persons using wheelchairs with disabilities affecting arms or with low stamina have serious difficulty using inclines. Most ambulatory people and most people who use wheelchairs can more easily manage a slope of 1:16 and runs of 20 feet (6100 mm). Many people have difficulty managing a slope of 1:12 for 30 feet (9150 mm). Ramps should be straight, not curved, unless engineering analysis has been performed to ensure that the slope of the curved ramp is not steeper than 1:12 anywhere along the line of travel and the maximum cross slope in Section 405.3 is not exceeded. All four wheels of a wheelchair must remain in contact with the ramp surface at all times.



For SI: 1 inch = 25.4 mm

Figure C405
RAMP WITH GUARD

Table 405.2—Allowable Ramp Dimensions for Construction in Existing Sites, Buildings, and Facilities

Slope[1]	Maximum Rise
Steeper than 1:10 but not steeper than 1:8	3 inches (75 mm)
Steeper than 1:12 but not steeper than 1:10	6 inches (150 mm)

[1]A slope steeper than 1:8 shall not be permitted.

The steeper slopes permitted for existing facilities are severely limited in rise and length to ensure that all four wheels of a wheelchair will not be on the sloped surface at the same time.

405.3 Cross Slope. Cross slope of ramp runs shall not be steeper than 1:48.

❖ The slope of a ramp in the direction perpendicular to the path of travel can greatly affect the use of a ramp. Where the "cross slope" of the ramp is too great, it can make moving on the ramp in a straight direction very difficult. If severe enough, it may create situations in which a chair user is concerned with tipping or could prevent a chair user or a person using a walker from being adequately supported. A larger cross slope can also affect pedestrians by causing their feet and ankles to tip to uncomfortable angles.

The cross slope of a curved ramp should be carefully designed and checked. A curved ramp is likely to have a difference in elevation from the inside to the outside of the curve, which creates a cross slope steeper than 1:48 and a curved surface on which only three of the four wheels of a wheelchair rest at any one time. Dangerous handling problems are therefore created for the person using a wheelchair. It is not possible to maneuver a wheelchair to precisely follow the curvature of the ramp. A curved ramp is negotiated by a series of rectilinear movements, with intermittent "corrections" to compensate for the curvature of the ramp. All portions of the curved ramp must also comply with the general slope provisions of Section 405.2.

405.4 Floor Surfaces. Floor surfaces of ramp runs shall comply with Section 302.

❖ Because the movement on a ramp is difficult enough, it is important that the surface of both the ramp and landings comply with the provisions of Section 302. This will assure that the surface provides a firm base of support without excessive cushioning, changes of level or openings.

405.5 Clear Width. The clear width of a ramp run shall be 36 inches (915 mm) minimum. Where handrails are provided on the ramp run, the clear width shall be measured between the handrails.

❖ The required ramp width corresponds to the minimum width for a passageway longer than 24 inches (610 mm). See Section 403.5. Based on the effort and types of movement needed to maneuver on the ramp, the 36-inch (915 mm) width makes the ramp easier to use for persons in a chair or using a walker or cane/crutches. Although handrails are permitted to protrude from the walls along an accessible route (see Section 307.2, Exception 1), in order for the handrails to not be an obstruction, the clear width should be measured between the handrails and also be available between any post supports for the handrail (see commentary Figure C405.5).

Figure C405.5
MINIMUM CLEAR WIDTH

405.6 Rise. The rise for any ramp run shall be 30 inches (760 mm) maximum.

❖ The ability to manage an incline is related to both its slope and its length. A person using a wheelchair with disabilities affecting arms or with low stamina has serious difficulty using inclines. Therefore, the code establishes a maximum rise of 30 inches (765 mm) for any ramp between landings or floor levels. Though accepted by the standard, some people may have difficulty managing a slope of 1:12 for 30 feet (9 m). Therefore, a smaller rise and lower slope would generally improve access. Most ambulatory people and most people who use wheelchairs can more easily manage a slope of 1:16 and runs of 20 feet (6 m) versus the permitted 1:12 slope and a 30 inch (765 mm) rise that would be obtained over a 30 foot (9 m) run.

405.7 Landings. Ramps shall have landings at bottom and top of each ramp run. Landings shall comply with Section 405.7.

❖ Landings provide an area for resting, turning or passing another wheelchair. They are, therefore, an important

part of creating accessible ramps that permit the transition from one level to another along an accessible route. The individual features of slope, width, length, change in direction and doorways are addressed by the referenced subsections (see Figure 405.7 and commentary Figure C405.7.4).

405.7.1 Slope. Landings shall have a slope not steeper than 1:48 and shall comply with Section 302.

❖ The general intent of this provision is to require that landings be level or have only a very low slope. The 1:48 slope is intended to match the cross slope provisions found in Sections 403.3 and 405.3. Providing a level landing where a ramp changes direction precludes the creation of a cross slope greater than 1:48, which could otherwise result from the simultaneous sloping and turning plane of the ramp surface. The 1:48 maximum slope will also permit sloping an exterior landing enough for drainage and yet still have it flat enough to be usable as an accessible route.

405.7.2 Width. Clear width of landings shall be at least as wide as the widest ramp run leading to the landing.

❖ This provision simply assures that the landing is at least as wide as any ramp that it serves and therefore does not narrow or reduce the available route of travel. If the ramp is wider than the minimum width required by Section 405.5, the landing width must also be increased even though the ramp is in excess of the minimum required width. This provision does not deal with the "required" width but is instead tied to the actual width of the ramp that the landing serves. The width of the landing may need to be increased from that specified by this section if the landing is being used to change the direction of travel. See Section 405.7.4.

405.7.3 Length. Landings shall have a clear length of 60 inches (1525 mm) minimum.

❖ A length of 60 inches provides a stopping distance, which is greater than the length of the wheelchair. This will also provide additional space to allow a chair user to maneuver before approaching another ramp, door or other object because the landing is longer than the wheelchair.

405.7.4 Change in Direction. Ramps that change direction at ramp landings shall be sized to provide a turning space complying with Section 304.3.

❖ The minimum landing where a ramp changes direction provides maneuvering space for the person using a wheelchair (see commentary Figure C405.7.4). The 60-inch (1525 mm) turning space may result in a landing that is larger than the width which is required by Section 405.7.2. This size landing can provide for a turning space in compliance with Section 304.3 or can allow passage of two chair users at the landing similar to the requirements of Section 403.5.2.

Providing a landing where a ramp changes direction precludes the creation of a cross slope greater than 1:48, which could otherwise result from the simultaneous sloping and turning plane of the ramp surface. See Sections 405.3 and 405.7.1.

405.7.5 Doorways. Where doorways are adjacent to a ramp landing, maneuvering clearances required by Sections 404.2.3 and 404.3.2 shall be permitted to overlap the landing area. Where doors that are subject to locking are adjacent to a ramp landing, landings shall be sized to provide a turning space complying with Section 304.3.

❖ This section serves to remind designers that the landing may be used for the dual purpose of also providing the

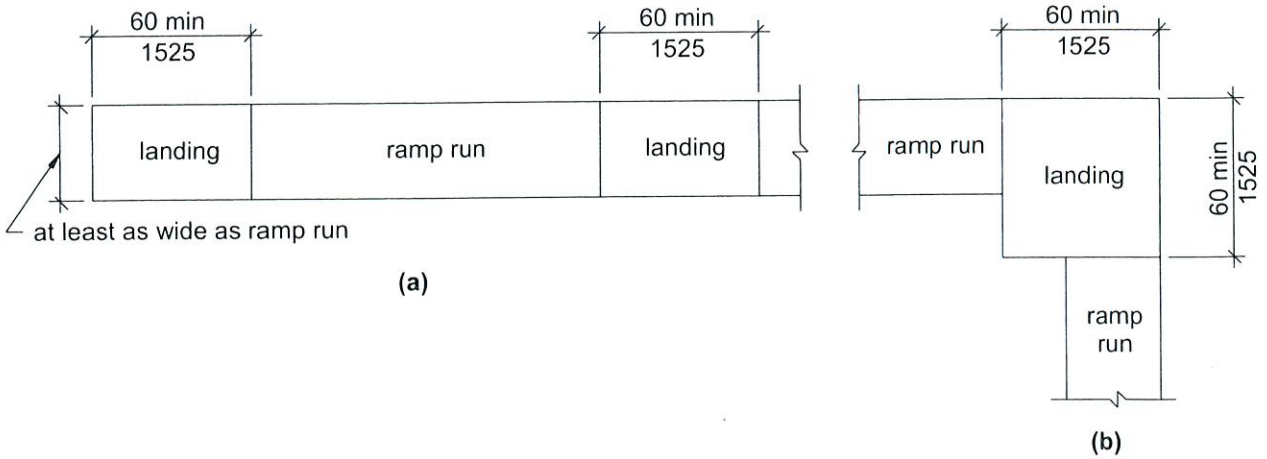


Fig. 405.7
Ramp Landings

maneuvering space adjacent to a doorway [see commentary Figure C405.7.5(a)]. One aspect of this section that is important to note, but is very subtle, is the fact that the doors are permitted only adjacent to the ramp landing and not adjacent or on the ramp itself. This wording about "adjacent to a ramp landing" can also be considered as supporting or reinforcing the provision of Section 404.2.4.5 that requires a level landing.

It is not possible for a person in a wheelchair to travel backwards down a ramp and maintain adequate control. If the door at the top or bottom landing of a ramp could be locked, a turning space must be provided at that top or bottom landing to allow the person to turn around and go back along the ramp if they cannot get in [see commentary Figure C405.7.5(b)].

405.8 Handrails. Ramp runs with a rise greater than 6 inches (150 mm) shall have handrails complying with Section 505.

❖ Handrails on ramps provide a graspable object for guidance and support while negotiating a ramp. Although handrails on ramps serve many of the same functions as those on stairs, the need for a handrail on a stairway is recognizably more critical because of the greater degree of difficulty involved in traversing a stairway as compared to a ramp. Handrails are nonetheless necessary for ramps because the ramp is not a flat, level surface and the user must exercise caution to avoid a slip or fall. The handrail provides a solid, stable element to grasp that can help arrest a fall. This is especially important for individuals with varying

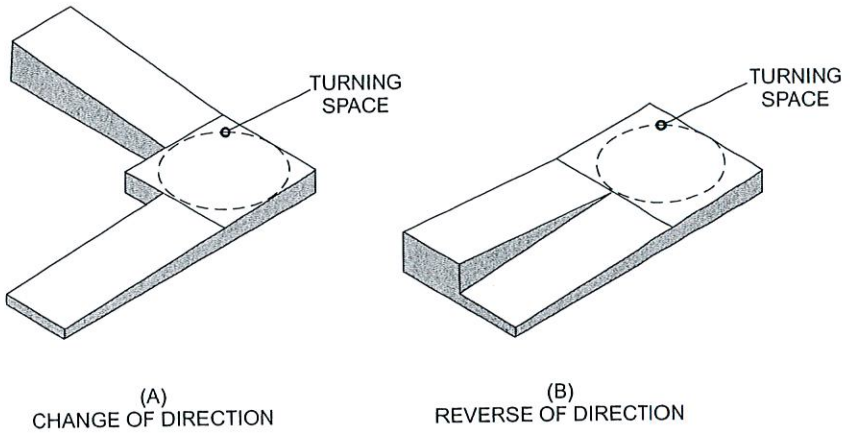


Figure C405.7.4
RAMP LANDINGS

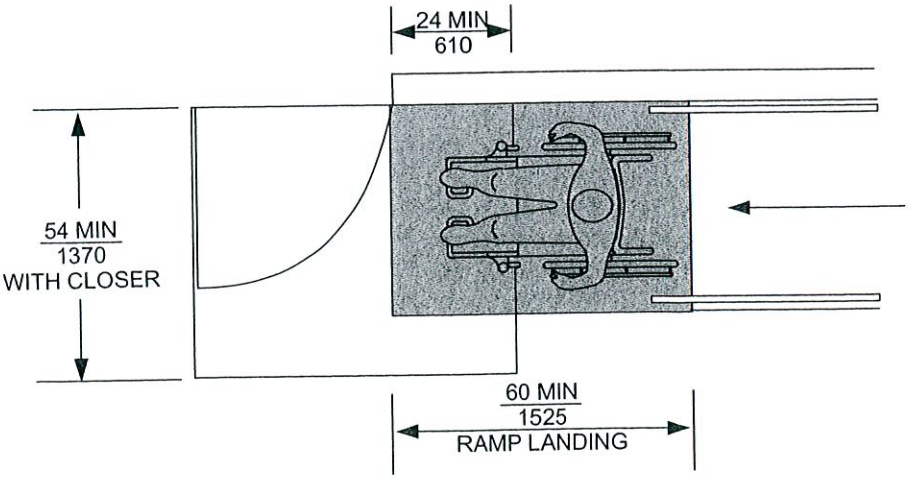


Figure C405.7.5(a)
RAMP LANDINGS AT DOORS

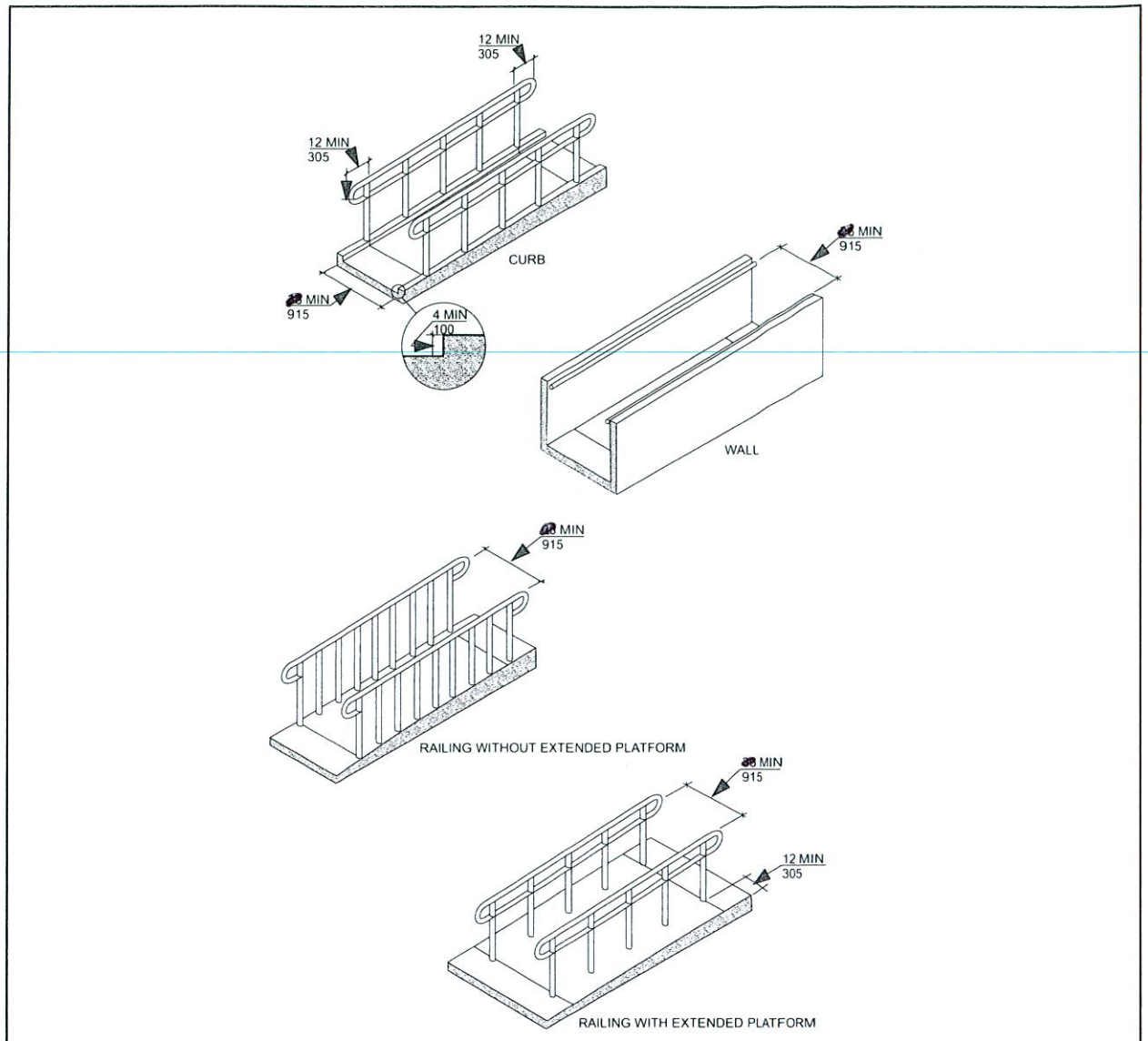


Figure C405.9
EDGE PROTECTION OPTIONS

tection. The first exception allows the use of flared sides adjacent to the ramp similar to those used for curb ramps. The second exception addresses a case that should really be self-evident, but will assure that a curb or other type of edge protection is not placed between the ramp and the landing. The last exception recognizes that when the ramp and landing are essentially at the same level as the adjacent ground or floor level that there is no danger of the user dropping off of the edge.

405.9.1 Extended Floor Surface. The floor surface of the ramp run or ramp landing shall extend 12 inches (305 mm) minimum beyond the inside face of a railing complying with Section 505.

❖ See commentary for Section 405.9, Figure 405.9(a) or the "extended platform" shown in commentary Figure C405.9. By extending the surface of the ramp or landing beyond the railing or by being at the same level as the floor or ground surface, a person using a wheelchair will be less likely to get near any edge where a wheel could drop over. This is also beneficial for persons using walkers, canes or crutches.

405.9.2 Curb or Barrier. A curb or barrier shall be provided that prevents the passage of a 4-inch (100 mm) diameter sphere where any portion of the sphere is within 4 inches (100 mm) of the floor.

❖ Any type of curb or barrier that can prevent the passage of a 4 inch (100 mm) diameter sphere at this low height will be adequate to keep the wheels of a chair from getting to the edge of the ramp or landing. Figure 405.9(b) shows how a bar which is elevated no more than 4 inches (100 mm) above the ramp or landing surface may provide this protection. The "curb" and "wall" fig-

ures shown in Figure C405.9 provide two other acceptable alternates. The "railing without extended platform" detail which is shown in Figure C405.9 could also be accepted if the spacing of the vertical balusters in the railing are located less than 4 inches (100 mm) apart. If the vertical balusters are spaced farther than 4 inches (100 mm) apart, then a curb, a horizontal rail or extended floor surface would be needed. If a curb is chosen, the curb must be a minimum of 4 inches (100 mm) high.

405.10 Wet Conditions. Landings subject to wet conditions shall be designed to prevent the accumulation of water.

❖ This is a universally sound design principle that has many benefits beyond the accessibility perspective. The concern of this standard is the potential safety hazard that would exist. Standing water can render a ground surface significantly more slippery for both foot traffic and crutch tips. In freezing climates, water that accumulates can freeze, creating an extremely dangerous condition for all pedestrians, including people in wheelchairs. Standing water at building entrances can be tracked inside the building, increasing the slipperiness of interior floor surfaces such as tile and terrazzo. Under most circumstances, the allowable slope of 1:48 will be sufficient for drainage. Care should also be taken to avoid drainage from overhead surfaces discharging onto ramp surfaces and approaches. In situations where gutters may freeze and overflow, it may be prudent to locate ramps so that they are not under gutters so that ice will not accumulate on the ramped surface. Wet conditions may also be found in some indoor spaces, such as adjacent to pool areas.

406 Curb Ramps

406.1 General. Curb ramps on accessible routes shall comply with Sections 406, 405.2, 405.3, and 405.10.

❖ Curb ramps are a unique type of ramp construction suited for use at curbs between sidewalks and vehicular ways or any other similar location wherein a change in level occurs along an accessible path. Curb ramp construction can comply with some of the provisions of Section 405 for ramps and be functional. For example, it would be impractical to require handrails (Section 405.8) or guards or other edge protection (Section 405.9) because of the obstructions such features would present to the surrounding areas, which are typically a circulation path or public way. The attributes that are unique to curb ramps make them suitable for their purpose primarily because of the limited rise (curb height) that they serve.

By the references to Sections 405.2 and 405.3, the primary sloped segment of a curb ramp is required to have a slope of 1:12 maximum and a cross slope of 1:48 maximum, the same as that for all other ramps. This is appropriate to provide a slope that can be negotiated by a wheelchair without great difficulty and is also consistent with Section 303.4, which effectively establishes that the slope of the transition between changes in level greater than $^1/_2$ inch (13 mm) is a critical consideration.

Because curb ramps are most often located outside, they should be constructed so water does not accumulate at the approach to or along the curb ramp. Water on the surfaces could cause slick conditions, so these surfaces should be sloped to drain (see Section 405.10).

406.2 Counter Slope. Counter slopes of adjoining gutters and road surfaces immediately adjacent to the curb ramp shall not be steeper than 1:20. The adjacent surfaces at transitions at curb ramps to walks, gutters and streets shall be at the same level.

❖ In general, this provision results in a transition across a curb that is reasonably and smoothly usable by a wheelchair while minimizing the impact of its presence on other pedestrian traffic. Counter slopes typically occur at the bottom of curb ramps because of the beveling of gutter sides or the crown of the road surface. Counter slopes steeper than 1:20 pose a risk that the footrest of the wheelchair could catch on the ascending slope of the gutter or road crown, ultimately tipping the person out of the wheelchair.

406.3 Sides of Curb Ramps. Where provided, curb ramp flares shall not be steeper than 1:10.

❖ One of the aspects of curb ramp placement that should be given careful consideration is their location relative to cross-pedestrian traffic. It would be preferable to locate curb ramps so that they do not extend perpendicular into a primary path of pedestrian travel. If they are not located out of the main circulation path, pedestrians are then faced with traveling across a portion of the curb ramp and stepping onto the flared side or the

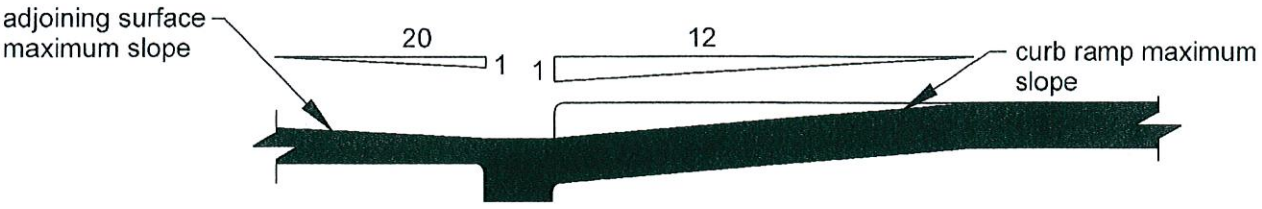


Fig. 406.2
Counter Slope of Surfaces Adjacent to Curb Ramps