
3.8 Ramps

1 Credit: Implement 2 of 3

- All ramps are as wide as the general circulation space and run in the same direction of the general circulation space.
 - All ramps with a run less than or equal to 6 feet (1830 mm) have a slope of 1:12 or less, and all ramps with a run greater than 6 feet (1830 mm) have a minimum slope of 1:15.
 - All ramps with intermediate landings have resting areas outside the circulation space.
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1. Overview

Elevation changes in the environment are unavoidable. There are very few places where topography remains level across a site. In addition, buildings have many floors and elevation changes within them. Stairs are used commonly to negotiate grade changes on a site. Sometimes, they are used to provide for a grand entrance to a building, or to add architectural interest to a room. In addition, building codes require buildings to have enclosed stairs for emergency egress. Wheeled mobility device users and people with temporary disabilities are not be able to safely traverse stairs. Stair placement and lack of alternatives for vertical circulation has a tremendous impact on these populations and others.

Stairs have become a standard method of circulation, and ramps are often not considered. For example, it is common for steps to be placed at the main entry of a home, especially where flooding is a threat. One way to grant access to wheeled mobility device users, while keeping a home above flood levels is to gently slope a walkway up to the entrance. Additionally, if a floor has level changes, then ramps would likely be the most socially integrated circulation option. The ramp could cover the entire width of the circulation space, as seen in *Figure 1*, which allows for the most access for all people.

2. Issues to Consider

Choosing Ramp Slope: Ramp slopes vary depending on the situation. Sometimes the site or an existing building may restrict how a ramp is designed. Ramps can require a lot of space, unless they are incorporated in the design from the start. The farther someone has to travel up a ramp, the more straining it can be on the user. If the ramp exceeds 6 feet in length, then a shallower slope of 1:15 is necessary. The slope should never exceed 1:12. People who commission the addition of a ramp to their house may want the ramp to be short in length. They may not understand that this could inherently make the slope quite steep, so the



Figure 1: Ramp as wide as general circulation space.

designer should be clear about the space required.

Someone in long term recovery, with a temporary disability, or with a permanent need to use a wheelchair may need to modify their home for easy access. They may not be familiar with ramps, and may not fully understand how various designs could affect them. Some contractors work with occupational therapists to help assess a space and choose what modifications need to be made (Span, 2017). Occupational therapists are able to recognize potential hazards and suggest solutions. A ramp is only inclusive if the people who need it can use it. The designer should explain different options and the effects each may have on the user.

Aging in Place: Life expectancy has increased since World War II for most of the world. Access to cleaner water, more nutritious diets, and victories against infectious and parasitic diseases have contributed to longer human lifespans (National Institute on Aging, 2017). Additionally, many people prefer to age in their homes. Complications of aging, such as loss of balance or muscle weakness, can change how someone goes about their daily activities. As a result, individuals may need to make modifications to allow them to keep living at home.

One aspect of this may mean adding ramps to the entrances of the home. “Visitability” is a concept that began in Europe and that “Concrete Change” founder Eleanor Smith helped proliferate in America. Visitability is used to describe whether someone who has trouble with steps or who uses a wheelchair or a walker could visit a place. Visiting includes being able to enter and use a bathroom in the space (Concrete Change, 2017). A step-free entrance is part of the basic requirements for visitability. A step-free entrance would furthermore make it easier for users with strollers, suitcases, or carts to enter a space.

Ramps, as opposed to stairs, are easier for people to use independently. Ramps are better integrated with the building when they are included in design from the start. A well-integrated ramp has the appropriate slope and matches the aesthetic of its surroundings. Such a solution in a home setting can allow for owners to age in place.

Location of No-Step Entrance: Some buildings are designed to have a grand entry, with a set of stairs leading to its main entrance. For example, the main entrance to a City Hall might have a long flight of stairs leading to its main entry. Although the entrance looks grand to those entering the building, it is exclusive of people who cannot traverse the stairs.

A city hall should be inclusive of everyone in the community, since it is a public building that houses governmental services. A secondary accessible entrance should not be used unless it provides the same convenience as the stepped entry. For example, a secondary entry that does not lead directly to the lobby would cause additional wayfinding issues for wheeled mobility device users. Future public buildings, and buildings that hope to draw in diverse groups of people, should implement ramps or a sloped primary entrance. This would still elevate the building while granting everyone the same point of entry.

Marking Sloped vs. Level Floor: Generally, building users do not give their full attention to navigating a space. Someone may become distracted by their thoughts, a conversation with a colleague, or the environment around them. Users may not notice a change in the slope of a path. In order to prevent a user from tripping, changes in flooring can help alert the user to this change. The flooring may change materials, using a more slip resistant material for the sloped ramp, or it may simply change colors from a lighter to a darker color. A visual or tactile cue can draw someone’s attention, and enable them to make the necessary changes to their speed or movement pattern.

3. Referenced Standards

[ICC A117.1 2017 Standard—405 Ramps](#) defines the standards for ramps in new and existing buildings. These standards provide in depth requirements for safely designed ramps. For instance, the standards detail what types of handrails and edge protections are necessary (International Code Council, 2017). The ANSI Standards, in comparison to the *isUD Solutions*, allow for a steeper slope. However, shallower slopes allow users to comfortably traverse up and down the ramp safely. It is easier for manual wheelchair users to propel themselves up, and electric wheeled mobility devices are easier to control on gradual slopes.

[ADA 2010 Standard—405 Ramps](#) allows for ramps that have a 1:10 slope, while the *isUD Solutions* have a maximum slope of 1:12. People in a wheeled mobility device, with a stroller, elderly adults, and anyone else who has difficulty with stairs benefit from having ramp access. The *Solutions* chose measurements that allow for safer travel for all people.

Neither of these standards requires a ramp to run in the same direction as the general circulation. One *isUD Solution* is to have the ramp and general circulation run in the same direction so that all users share a similar experience. The standards also do not require resting spaces outside of the general circulation. Another *isUD Solution* suggests resting spaces to allow people of varying abilities to use the space. Allowing someone to be outside of the circulation space will let people rest without interfering with the path of travel.

4. Measurement and Verification

The slope of a ramp can be measured by using a level. Some levels have a digital screen and the user can select whether to read the measurement in degrees, ratios, or percentages. A conversion chart for the slopes used in this section is provided below.

| Slope (Ratio) | Slope (Degrees) | Slope (Percentage) |
|---------------|-----------------|--------------------|
| 1:8 | 7.13° | 12.5% |
| 1:10 | 5.71° | 10% |
| 1:12 | 4.76° | 8.3% |
| 1:15 | 3.83° | 6.7% |

The length of the ramp, or run, can be found by measuring the horizontal distance from one landing to another. If this measurement is not easily attainable, then it can be calculated using the surface length of the ramp and the change in height from one landing to another.

5. Design Considerations

1. *All ramps are as wide as the general circulation space and run in the same direction of the general circulation space.* A ramp that does not run in the same direction, or that is not as wide as the general circulation can cause confusion among those trying to navigate the space.

In Figure 2, the ramp on the left would be difficult to notice from further down the hallway. Unless there are clear signs in the space showing people that there is a ramp in that direction, a user would not easily find it. Also, this ramp on the left increases the distance the wheelchair users must travel, and excludes them from the primary path of travel.

The ramps on the right in Figure 2 allow ambulatory users and manual wheelchair users to share the space. Neither is disconnected visually or spatially from the other. The ramp on the far right shows equal access given to all users. If multiple people prefer the ramp, they have adequate space to navigate crowded traffic. Although the ramp on the left allows people access to a ramp, it emphasizes the differences between the people in the space. The ramps on the right are more inclusive, and are considered more culturally appropriate options.

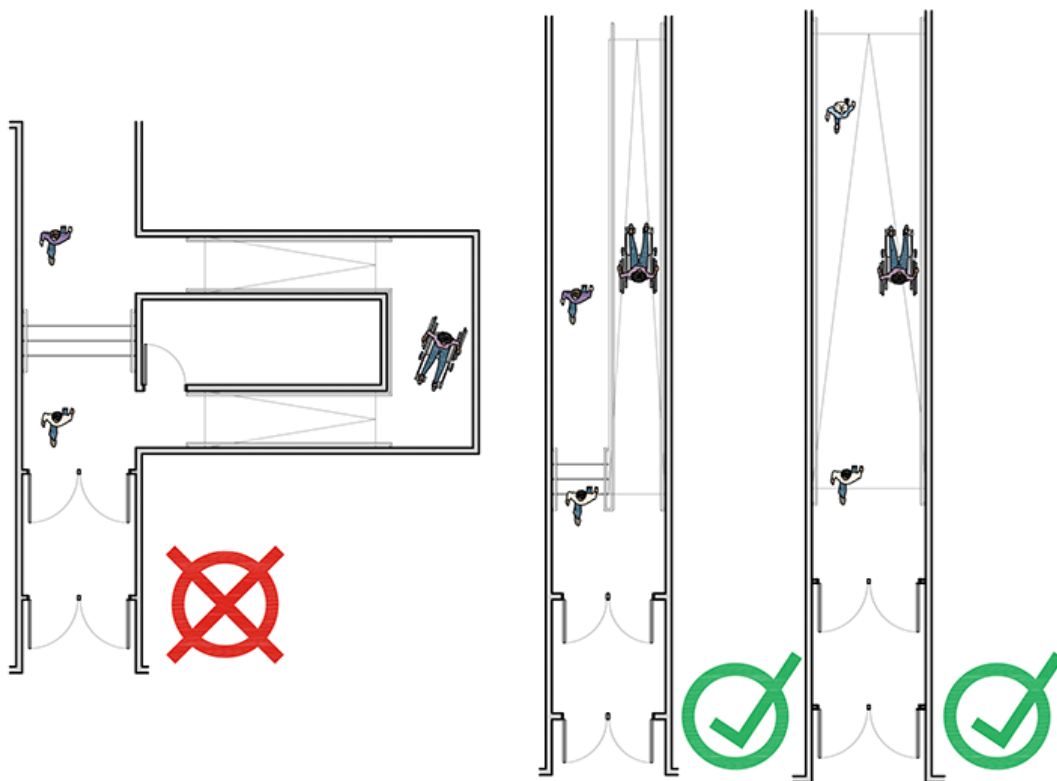
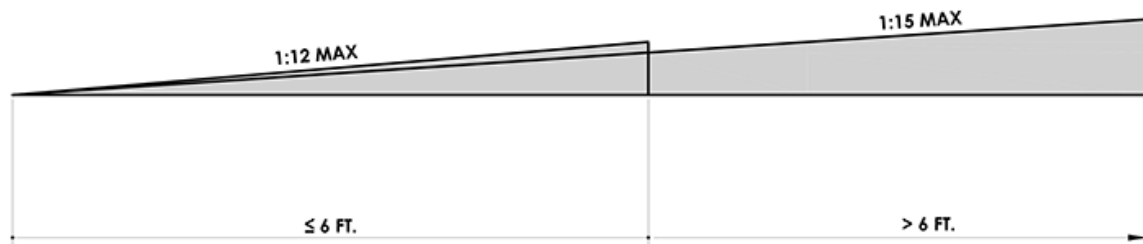


Figure 2: On the left, a ramp does not run in the same direction as the general circulation space. On the right, both paths are integrated.

2. All ramps with a run less than or equal to 6 feet (1830 mm) have a slope of 1:12 or less, and all ramps with a run greater than 6 feet (1830 mm) have a minimum slope of 1:15. Ramps help those who are older, have a temporary disability, or are traveling with children in a stroller move around a space. The *isUD Solutions* consider 1:12 to be the steepest slope allowable for ramps.

Figure 3 shows the difference between 1:12 to 1:15 slopes. Strain on the body builds as the user travels up a sloped surface. One way to make traveling a ramp easier is to use a shallower slope, or provide landings that break up a ramp's length. The user could utilize resting area to reduce their fatigue, and start again when they want.



| MAXIMUM SLOPES | | |
|----------------|------------|------|
| SLOPE | ACCESSIBLE | UD |
| ≤ 3 FT. | 1:8 | 1:12 |
| ≤ 6 FT. | 1:10 | 1:12 |
| > 6 FT. | 1:12 | 1:15 |

Figure 3: Maximum slope for given horizontal length.

3. *All ramps with intermediate landings have resting areas outside the circulation space.* A user may need to rest while traversing multiple ramps. The landing space should allow users to leave the path of circulation. This prevents others from having to walk around them, and will make anyone who wishes to rest more comfortable. Benches and vending machines are located in the resting areas in Figure 4. The rest area can house various items that a user may want, e.g. a water fountain. There should be enough clear floor space for a wheeled mobility device user to turn in the rest area.

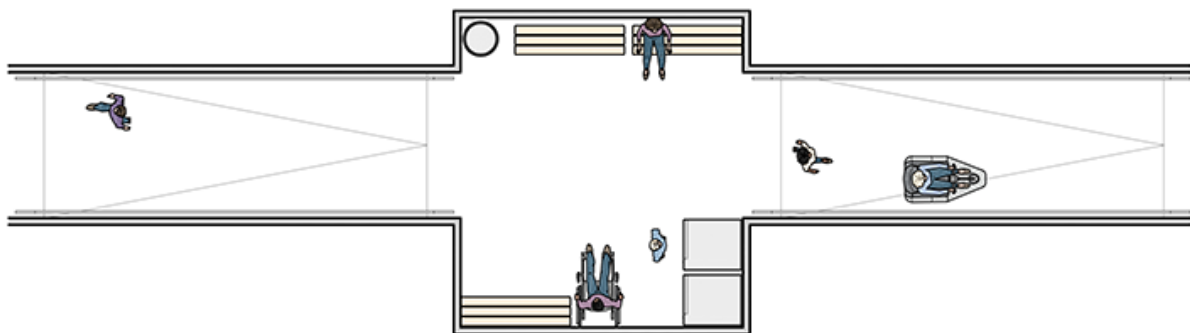


Figure 4: Ramp with resting area at landing.

6. Definitions

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| Landing | A level surface that comes before, after, or between ramps. |
| Rise | The elevation difference between one end of the ramp to the other end |
| Run | The horizontal distance the ramp covers in ground floor space. Do not confused run with the angled surface length. |
| Slope | In mathematical terms, the degree to which a surface differs from being level, commonly measured in degrees, a ratio, or a percentage. Slope can be defined mathematically as Rise / Run. |
| Visitability | An affordable, sustainable, and accessible design approach to single-family housing initiated in 1987. A visitable home is one that meets only three conditions: one zero-step entrance, doorways that provide 32 inch clearance, and access to at least a half bath on the main floor (Maisel, 2010). |

7. References

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