

## AmBility – AMBUCS Building Ramps

This guide will provide basic information on ramp building to provide access for people with disabilities. It will provide you with links to a source that has a proven track record – The Home Ramp Project (Metropolitan Center for Independent Living, Minnesota Division of Rehabilitation Services), hereafter referred to as the Minnesota Ramp Project. Their full manual (63 pages) is available online along with a printed version and a videotape about the project. (Ordering information is at the end of this document). The Minnesota Ramp Project uses a modular design for building ramps that allows them to be easily recycled when no longer needed. Their ramp project was honored as a finalist in the 1995 Ford Foundation “Innovations in American Government” award program.

If you are already building ramps in your community, take the time to read over this information and see if you can improve your program plus find additional funding and sources for help. If you haven't built ramps before, this should give you all the information you need, except for your local building codes. We will also provide some information for long-tread, low-riser steps that are easier to use than ramps for some people.

**Volunteers.** Construction crews of 3 to 4 volunteers are needed for each ramp project. The supervisor of the project can be a volunteer or paid; in any case, that person must be well versed in proper construction techniques and compliance with building codes. The amount of time required will vary according to the complexity of the ramp design. The work is physically demanding and can require post-hole digging, shoveling, using a power saw, nailing, lifting, and perhaps minor concrete work.

In some cases, companies will provide employees to help build ramps as part of their community service work. High schools, technical colleges, church groups, service clubs (AMBUCS, Jaycees, Lions, etc.), scout organizations, unions, employee service groups, government agencies, rehabilitation facilities, centers for independent living, and many others can be accessed for collaboration in building ramps. If you have a university Pi Kappa Phi chapter near you, their national outreach program PUSHAmerica helps with ramp building through their ACCESSibility project. More information is available on their web site: <http://www.pushamerica.org/>

**Resources.** This section has information about finding the resources needed to get the ramp or steps built. This list is not comprehensive but is intended to provide

ideas to help you get started. How much a ramp or steps will cost depends on how long the ramp has to be or how many risers are needed to get into your home. Please review the *Basic Design Considerations* before deciding on the final layout of your ramp or steps. Once you have determined the layout, you can figure out how much lumber and hardware will be needed. Lumber yards and building supply stores can then give you an estimate and may provide you with a discount if you tell them the purpose of the materials.

- **Centers for Independent Living**, local non-profit organizations that provide a variety of Independent Living services for people with disabilities, are likely to have information about access modification resources. Contact the National Independent Living Council at 703-525-3406 to locate a center near you.
- **The yellow pages directory and the government section of your phone book** is another information resource for your area. In the yellow pages, look under categories such as Social Service Organizations, Human Services Organizations, Disabled Persons Assistance, and Services for Seniors. In the government section look for the state and county human services agencies, as well as the local building officials office. Many of the resources in this section will be listed in the phone book.
- **Local Building Officials** can provide valuable information regarding permit and zoning requirements for modifications to homes. They are usually located in the inspections or building permit office of city government.
- **State and Area Agencies on Aging** are a good information source for local programs that assist seniors with services including home modifications. The Department of Health and Human Services Administration on Aging web site has a state directory available at <http://www.aoa.dhhs.gov/agingsites/state.html>
- **Local and national offices of disability specific organizations** such as the Amputee Coalition of America <http://www.amputee-coalition.org/>
- Multiple Sclerosis Society <http://www.nmss.org/>
- Muscular Dystrophy Association <http://www.mdausa.org>
- National Spinal Cord Injury Association <http://www.spinalcord.org> and others may have information or assistance available.
- **Local hospitals, rehabilitation facilities and medical equipment supply companies** may have staff who are familiar with resources in your area.

**Specific Programs that may fund ramps and steps.** The following are several Federal and state programs that can provide assistance. Most have eligibility requirements and it is important to make sure all of the required paperwork has been completed before ramp or step installation is started.

- Department of Housing and Urban Development (HUD) **Community Development Block Grant Program (CDBG)** and **Home Investment Partnership Program (HOME)** Their web page <http://www.hud.gov> has a large amount of information available. City or County Community Development Agencies or Housing Redevelopment Authorities may manage CDBG and HOME programs in your area or they will know who does. These programs are excellent resources for moderate and low-income individuals and for programs that want to provide home modification assistance to people in their communities.
- The U.S. Department of Agriculture Rural Development has **Section 504 Loans and Grants** that can be used for accessibility modifications and to repair homes. The objective of the program is "to help very low income owner occupants of modest single family homes in rural areas repair those homes." Grants are possible for homeowners age 62 and over who qualify financially. State office location information is at [http://www.rurdev.usda.gov/recd\\_map.html](http://www.rurdev.usda.gov/recd_map.html).
- The Veterans Administration **Home Improvement/Structural Alteration** program can provide assistance for qualified veterans. Call a VA hospital or veterans assistance organization for more information.
- State **Housing Finance Agencies, Authorities or Corporations**. These programs are called different things in different states. About one fourth of these state agencies have programs that provide assistance for access modifications to single family homes.
- **Home and Community-Based Waiver Programs** administered by county medical assistance or services programs may pay for modifications for those who are eligible. Check with your county about eligibility requirements
- The State **Vocational Rehabilitation Program** may assist eligible individuals with home accessibility modifications, if the modifications are needed for getting and maintaining employment.

**Community Resources.** **Building contractors** can usually build ramps and steps, but do not assume they are familiar with proper access design. It is appropriate to give them the information in the design chapter of the "How to Build Ramps" manual of the Minnesota Ramp Project. If you want to have a modular ramp or steps installed, you can ask the contractor to use the plans from the manual.

**Community service organizations** can also use the plans in "How to Build Ramps" to install ramps and steps. There are many groups that may volunteer to help in building ramps and steps for people. Some of them are:

- Telephone Pioneers of America <http://www.telephone-pioneers.org/>
- Civitan International <http://www.civitan.org>

- Habitat for Humanity <http://www.habitatforhumanity.org>
- Veterans of Foreign Wars <http://www.vfw.org/comm/index.shtml>
- Connect America movement founded by Points of Light Foundation <http://www.pointsoflight.org>
- Jaycees <http://www.usjaycees.org/>
- Lions <http://www.lionnet.com/>
- Church organizations, colleges, vocational schools and high schools may have community service programs that could provide volunteers, as well. Lumber yards and building supply stores can be approached for donations of lumber and supplies.

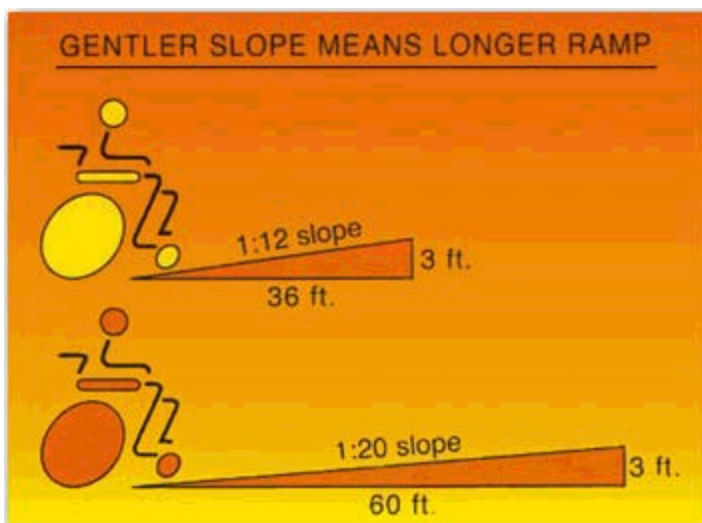
It is common for a combination of resources to be used to get ramps and steps installed. Many programs have limited funds available and may be able to offer only partial assistance. Working with more than one agency or organization is often necessary in order to obtain a ramp or steps. Persistence is one of the best tools available for finding the resources needed to get a ramp or steps installed.

**Useful Points to Consider.** When you have decided that building a ramp is the best solution, consider the following:

- Who is the primary user?
- What type of assistive device does the person use (cane, crutches, walker, manual or electric wheelchair, motorized 3-wheel cart)?
- Will the person's abilities change? Plan for anticipated changes.
- Will the person use the ramp independently or will help be needed?
- Who will provide help and what are that person's abilities?
- Which entryway is best for the ramp? Consider the inside as well as outside. Narrow doors or hallways can prevent access to a doorway from the inside.
- Placement of existing door handles and swing direction of doors.
- Where does the person want to go most often (garage, driveway, front sidewalk)? Where is the best place to access transportation?
- If there is an attached garage, can a ramp be placed inside?
- How will the ramp affect available yard space?
- Are there barriers such as trees, shrubs, poles, etc.?
- How will the ramp appear?
- What are the local zoning requirements for lot lines and set-backs?
- What will the cost be? Is there help available for financial assistance if needed?
- Is there a concern about security and "curbside" appearance? If so, locating the ramp to the side or back of a property may minimize the visual indication of a resident with a disability.

**Basic Design Considerations.** The following excerpt is from *QUEST*, Volume 5, Number 2, April 1998, a publication of the Muscular Dystrophy Association. The article is entitled "Ramp It" and was written by Phil Ivory.

**Rise Over Run Equals Slope.** Perhaps the most important consideration is the slope, which is determined by ascertaining the "rise" -- the straight vertical distance a person will travel when going up or down a ramp -- versus the "run," which is distance measured along the ground from one end of the ramp to the other. The ratio of rise over run gives you the slope. (A measurement taken up the sloping surface of the ramp is something else entirely.)



To reach an entrance 3 feet above the ground, a ramp with an ADA-prescribed 1:12 slope would have to be 36 feet long. A more gentle 1:20 slope would require 60 feet of length to reach the same height. Level landings should be used between ramp segments in both cases.

A 1:12 slope is one in which the ramp builder must allow 12 feet of horizontal extension for 1 foot of vertical height. (It's not important whether the measurement is in feet, inches or centimeters, but rise and run are usually expressed in one of these units.) Many people confuse the fact that a 1:20 slope is less steep than a 1:12 ramp. The larger the second figure, the more gentle the slope.

The ADA mandates that ramps in public places must not be steeper than 1:12, and that's generally found to be a good guideline in building ramps on homes. But while a 1:12 slope may be OK for a person in a motorized wheelchair, it may be tough for a manual wheelchair user. A more gentle 1:16 or 1:20 slope may be in order.

The downside of building an easy, gradual slope is that it requires a greater amount of distance extending out from the home. If your front door is 3 feet off the ground, per the 1:12 slope ratio you'd need to have a ramp extending 36 feet. A more gradual slope would need to be even longer. But what if there's only 20 feet from your front door to the street or driveway, or if there's something in the front yard such as a tree or a garden that you can't bear to disturb?

A designer may be tempted to lessen the run by making the ramp steeper, but that's almost always the wrong choice. A ramp that's too steep may require too much muscle power for those in manual chairs, or for those pushing them, and a power wheelchair can topple backwards from its own weight. They can also cause or aggravate back problems for helpers pushing a chair up a ramp, or controlling a chair traveling down one.

***Twists And Turns.*** One way to address the length problem without increasing the slope is to build turns into the ramp, making it in an "L" shape or even making a "switchback ramp," one which includes at least one 180-degree turn.

When turns are included, the ramp must level off at a landing large enough to allow a wheelchair to turn with ease, and then a new ramp segment continues in a new direction. The landing at each turn should be at least 5 feet by 5 feet.

Another landing is necessary at the top of the ramp by the door to the house. Without it, the person in the wheelchair is in danger of slipping back down the ramp while trying to get the door open. The height difference between the top of the ramp and the door shouldn't be more than half an inch. The same is true for the distance between the bottom of the ramp and the ground.

Even without turns, a ramp segment shouldn't extend more than 30 feet without stopping for a landing. "You don't want to go on a continuous slope for more than that," says Bob Zimmerman, an independent living counselor with the Minnesota Division of Rehabilitation Services. "Some people want a rest spot every 15 feet. That's where you have to examine the needs of the individual."

"The most important part of access design is considering the person's total situation in order to come up with the best solution," Zimmerman says. "Sometimes ramps are not the best choice and looking at lifts or other options is important. If you don't have the room, a lift may be your only choice."

Also, the location of the ramp -- front door, back door or elsewhere -- is an important consideration that needs to be carefully thought out.

From the Minnesota Ramp Project guide comes the following information.

**Determining the Slope.** The slope determination process starts by first establishing how much total rise has to be covered. Two measurements must be checked to determine this figure. The first figure is the distance from the exit door's sill down to the ground, or "grade", at the house's foundation. Since a ramp is constructed a certain distance out from the house into the yard, though, any change in grade in the area for the ramp's construction also must be taken into account. For example, if the change in grade from a home's doorsill to the ground at the foundation is 29", and the yard out where the ramp will be sited is flat-no change in grade-then the total rise that must be covered is 29". However, if the change in grade at another house's foundation is 29" (a), but the yard where the ramp will be located drops away another 13" (b), then the total rise that must be covered is 42" (c). (See below)



Once total rise (typically stated in inches) is determined, it is then multiplied by the slope (in inches) chosen, to obtain the total amount of horizontal projection (in inches) required to achieve the particular slope. Dividing this figure by 12 converts it into a more workable measurement of feet of horizontal projection required. For example, say that a ramp with a 1:12 slope is to be built at the home with a 29" total rise described above. The required horizontal projection is  $29" \times 12" = 348"$ , or when converted to feet, 29'. Say, however, that a ramp with a gentler slope-a 1:16-is desired.  $29"$  of total rise  $\times 16"$  of slope = 464", and when divided by 12 to convert to feet, equals over 38 feet of horizontal projection needed. It's important to note that the resulting figure is a measurement of amount of horizontal projection the layout must contain to achieve a desired slope. It is not a

measurement of distance traveled along the inclined surface, as some people mistakenly believe, and it **doesn't** include any distances/areas required for necessary landings-these are extra.

**Landings.** Landings are the level areas required at the top, bottom, and sometimes at intermediate locations in a rampway. These areas allow a person to maintain balance while performing tasks like opening doors, transferring in and out of a vehicle, resting for a time, and safely changing direction of travel when a ramp makes a turn. Recommended landing sizes are based on these functions.

**Top Landings:** Top landings should be nearly flush with the exterior door threshold. 1/2" is the typical maximum, particularly when a wheelchair user is involved – anything larger will abruptly stop a chair's relatively small front wheel, or is a tripping hazard for walkers. Pay attention, too, to threshold specs if a new primary door is being installed. If a prehung unit's going in, most don't have the low threshold that's needed here.

For homes on footed foundations, it's advisable in most places to bolt the top landing into the home's foundation. This will avoid the potential problem of the relatively lightweight ramp landing lifting up due to frost heave and jamming under an outswinging door (like a storm door). For unfooted structures, or temporary foundations such as mobile homes on blocks, bolting the landing may still be appropriate, but the ramp shouldn't be footed for the opposite reason. Local soil conditions – e.g., clay vs. loam – will also play a definite role here.

Top landings at minimum should be at least 60" X 60" if there is an outswinging door, with at least a 12" to 24" of "elbow room" space provided off the door's handle side, particularly for a person using mobility equipment. These dimensions give enough room for a person to move off to the side while opening the door without having to back up to get out of the way of its swing. If there is no outswinging door, the landing may be somewhat narrower – probably 48" at minimum.

**Intermediate Landings:** Intermediate landings for a long, in-line run of ramp can have the same width as the running surfaces, and length can range from 36" to 60" – the slope chosen is a factor to account for here, with a steeper slope like a 1:12 requiring a longer distance in which to stop when descending. A rough guideline to use is to install an intermediate landing if a section of ramp covers more than a 30" change in rise, but persons with limited stamina/control may need one sooner than this. Dimensions for intermediate landings where a direction change occurs depend on ramp width and the user's circumstances. When a chair user is involved, a 48" X



48" landing for a 90 degree turn is comfortable; for an 180 degree turn, 48" by twice the width of the two ramp sections is typical.

**Bottom Landings:** For bottom landings, typical minimum dimensions when in-line travel is involved are as wide as the ramp by about 48" long for someone walking, and about 60" to 72" for a chair user. Larger-width landings may be called for if the person has to make a direction change (e.g. 90-degree turn). Make sure the ramp/landing intersection doesn't have a "lip" greater than 1/2" which would become a tripping/rolling hazard.

**Rampway Widths and Running Surface Features.** Running surface widths can range from 36" to 48", depending on the personal assistance or mobility equipment involved. A width of 36" may be appropriate for someone walking or using a cane, crutches, or a walker (32" may be appropriate for persons who need to lean on both railings when moving). A width of 42" to 48" is appropriate for someone using a wheelchair or where a person can walk with assistance at the side.

Surface height changes from the doorsill and top landing to the bottom landing shouldn't vary more than 1/2". Higher bumps can abruptly stop a wheelchair or trip people walking, particularly those with an irregular gait.

All ramp runs and landings must be level from side to side. A cross slope (slope perpendicular to the direction of travel) can upset a person's balance and require more strength and effort on the person's "downhill" side. Even the almost unnoticeable slope (1:96) built into public sidewalks to aid with water runoff can be tiring for a wheelchair user to negotiate.

It is advisable for ramps to have an "anti-slip" running surface; depending on local building code enforcement, this may be a requirement. On wooden ramps, treatments that are used include commercially-available "grit" tapes, strips of rolled roofing or shingling, or laying down coats of polyurethane into which sand is sprinkled. For concrete ramps, the surface can be brushed with a broom before it hardens to create a rough texture.

**Safety Features.** Installation of safety features including handrails, guardrails, "crutch stops," guttering and sheltering should also be considered for a rampbuilding project.

**Handrails** should account for variables including a person's height, arm and hand strength, how the rails are used, and any local building code requirements that may

apply. For example, standing users who lean on rails for support with arms extended often need a very different rail height than that used by persons propelling a wheelchair by pulling along the rails. 31 " to 34" is the typical height range, and the rails should be capable of supporting a 250 lb. load at any point along the length. The diameter should be no more than 1 1/2", and may need to be smaller for children or adults with impaired grip strength. The preferred material is wood. Metal piping is sometimes used, but may present a problem for exposed skin in the wintertime.

**Guardrails** and edging called "crutch stops" or "bump boards" are also good safety factors that keep users from slipping off the side of a ramp or landing. Guardrails are mounted along the structure's perimeter, usually at a seated person's knee height-18" to 20" or so. "Crutch stops" are curbing mounted on, or a few inches above, the surface of the structure's perimeter.

Two additional safety features to consider are guttering and sheltering. If not present, roof gutters may be advisable for ramps running close to a home to handle water runoff that may create slipping hazards. In cases where the person's mobility is severely restricted, some form of rampway sheltering may also need to be considered. Depending on siting and home roofline, one strategy for ramps hugging a house is to build a small extension off the roof. Support for the lower edge can be provided by extending the ramp's posting vertically.

More information regarding Ramp Layouts, Construction Methods, Codes and Permits, Ordering Materials, Materials Order Form, Building Process, and many pages of engineering designs for the various ramp and step components may be found in the Ramp Manual, see below.

#### **The Manual:**

- Preview the complete [Ramp Manual](#) using your web browser, which will link you to **every page** of the entire published manual.
- The RAMP Manual is also available in a single [archive \(a ZIP file\)](#) which is convenient for off-line browsing and group presentations. See the [README.TXT](#) file for details.
- You may also purchase a printed copy of the manual from the Metropolitan Center for Independent Living (MCIL). The manual is \$15 and videos (VHS only) are \$20 each (prices subject to change without notice). Please make checks payable to MCIL and mail to: MCIL, 1600 University Avenue, St.

Paul, MN 55104-3825. You may also contact Jim at 651-603-2029, 651-603-2006 Fax, or [MCIL2@aol.com](mailto:MCIL2@aol.com).

### Videotapes:

- **Tips for Building Modular Ramps and Steps**, a 30-minute video companion to the construction manual. This new video illustrates the design and construction techniques that are in the manual. Great for project leaders and construction volunteers. See ordering information above.
- **Hometime [video # 4056, Building & Remodeling for Accessibility](#)** (30 Minutes) features a project ramp (using recycled plastic planking), kitchen and bathroom accessibility, and other useful projects. Order directly from Hometime (<http://www.hometime.com>), \$11.95 plus shipping.

**Ramp Alternatives.** For many people with mobility impairments, [long-tread low-riser steps](#) can be easier and safer to use when compared to a 1:12 slope ramp. The large level area allows easy walker use, and the riser's short height makes stepping up and down easier than standard steps. Balance is easier to maintain on the flat steps than on a sloped surface; the steps require less space than a ramp and are less expensive. Like our ramps, the modular design allows the steps to be easily installed, used as long as needed, and removed for use at a new location. Tips for [using long-tread low-riser steps with a wheelchair](#). See a safe technique to use these steps to assist a person in a wheelchair.

### Other Sources of Information

- The Department of Housing and Urban Development (HUD) offers a 60-page report with information for those working to make home modifications, and the universal design principles they embody.
- HUD has also published *Residential Remodeling and Universal Design: Making Homes More Comfortable and Accessible*, a guidebook for the housing professional or the do-it-yourselfer. These and other titles may be found on line at <http://www.huduser.org/>, or call 800-245-2691.
- The Center for Universal Design, a part of the School of Design at North Carolina State University in Raleigh, specializes in promoting accessibility and a universal design in buildings. Research, training, technical assistance, referrals and other information are available to individuals. People interested in universal design can obtain publications, videos and other resources. For more information, call 800-647-6777 or (919) 515-3082, or log on to The Center's Web site at <http://www2.ncsu.edu/ncsu/design/cud>.