

WHEELCHAIR RAMP PROJECT GUIDE

Tools and Materials:

See the Training Website- Construction Resources Page for a material and supply calculator.

- ▶ 2x6 treated lumber**
- ▶ 2x4 treated lumber**
- ▶ 5/4" decking board**
- ▶ 4x4 treated lumber**
- ▶ Quikrete Concrete Mix**
- ▶ Lag screws
- ▶ Carriage bolts**
- ▶ 2 and 2 ½" galvanized decking screws/nails**
- ▶ Stand-off post anchors
- ▶ Joist hangers**
- ▶ N10 Hanger nails**
- ▶ 2 ½" and 3" exterior screws**

- ▶ Circular Saw**
- ▶ Chalk Line
- ▶ Measuring Tape**
- ▶ Post Hole Digger**
- ▶ Line Level
- ▶ 4' level**
- ▶ 6' level
- ▶ Plumb bob
- ▶ Hammer**
- ▶ Drill with bits**
- ▶ Framing square**
- ▶ Ratchet and socket set**

**denotes materials that are necessary to complete the project.

Prep:

It is helpful to have a large group of people to complete this project. However, preparation is critical to the success of the project. It is much better to prepare before the crew is present at the work site. Always keep in mind: *the more you are prepared, the easier the ramp will be to build.*

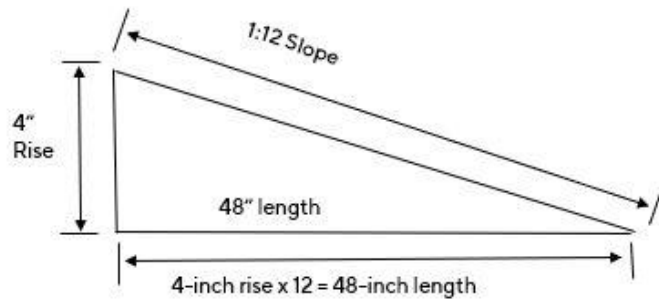
Before You Build

It is important to contact the local housing authority or city hall office in the community and ask about the local code and zoning requirements. You probably will need to obtain a permit before building. Be sure to allow enough time to secure the permit before beginning the project. When obtaining a permit, be prepared to share the design of the proposed wheelchair ramp. You will most likely need to share the length, width, height and distance from the sidewalk for the proposed wheelchair ramp. To save time, call the office to learn the appropriate steps to obtain the permit. At times, the application process can be completed online.

Measuring Your Work Area

1. If planning a ramp on uneven ground, it is important to find the distance to where the ramp will end. The measurement at the end of the ramp will not be the same as the measurement at the beginning of the ramp.
2. According to the Americans with Disabilities Act (ADA) standards, the steepest slope a wheelchair ramp can run is a 1:12 ratio. This means for each vertical inch, the ramp must go

12 inches out. Therefore, if the distance from the threshold of the most accessible exterior door to the ground is 18 inches, you will be required to have 18 feet worth of ramp sloped at 1:12.



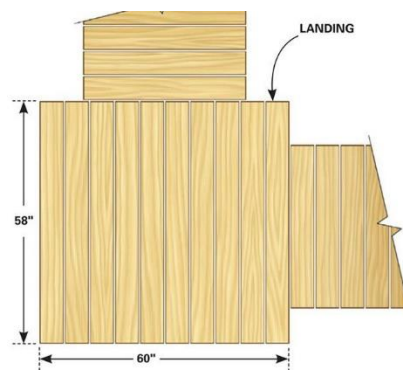
3. All ramps must begin with a minimum landing of 5'x5', enough space to maneuver a wheelchair. Build this section like you would a porch.

Determine the Design

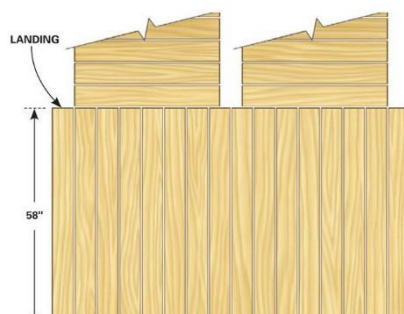
If possible, look on Google Earth and print an overhead of the property to plan your ramp around obstacles.

The furthest a ramp section can go without a landing is 8 feet. There are two different landing types you can build.

1. **Landings for turns:** these are designed to make a 90-degree turn. This is good to build if you are constricting an "L-shaped" ramp (more on this later).



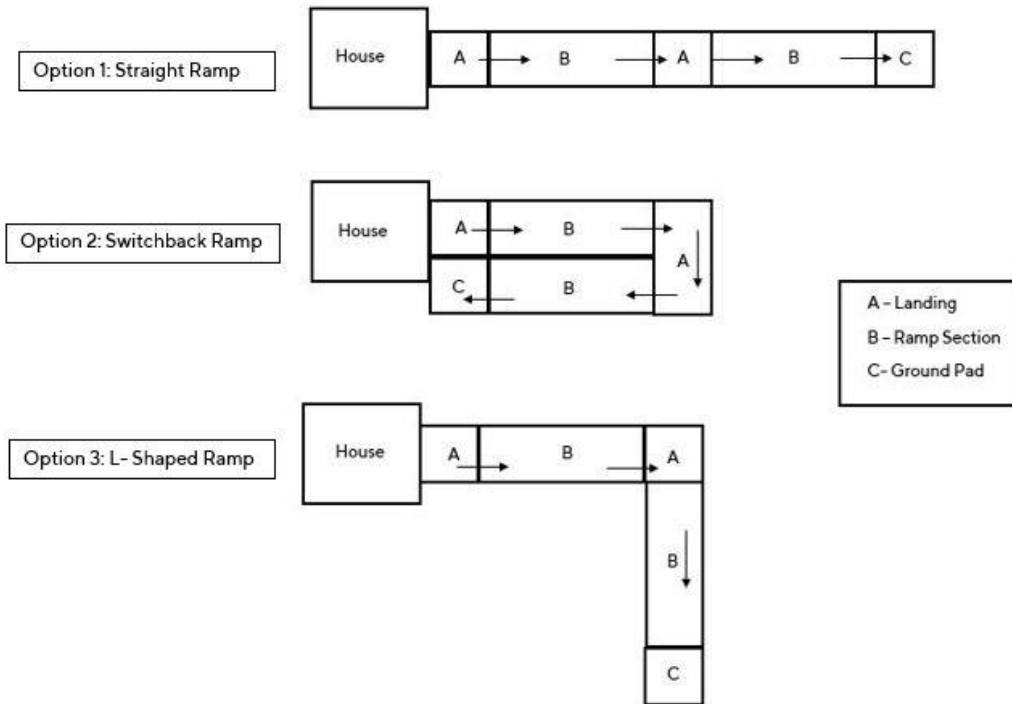
2. **Landing for switchbacks:** these landings are designed for 180-degree turns as needed on a switchback-style ramp.



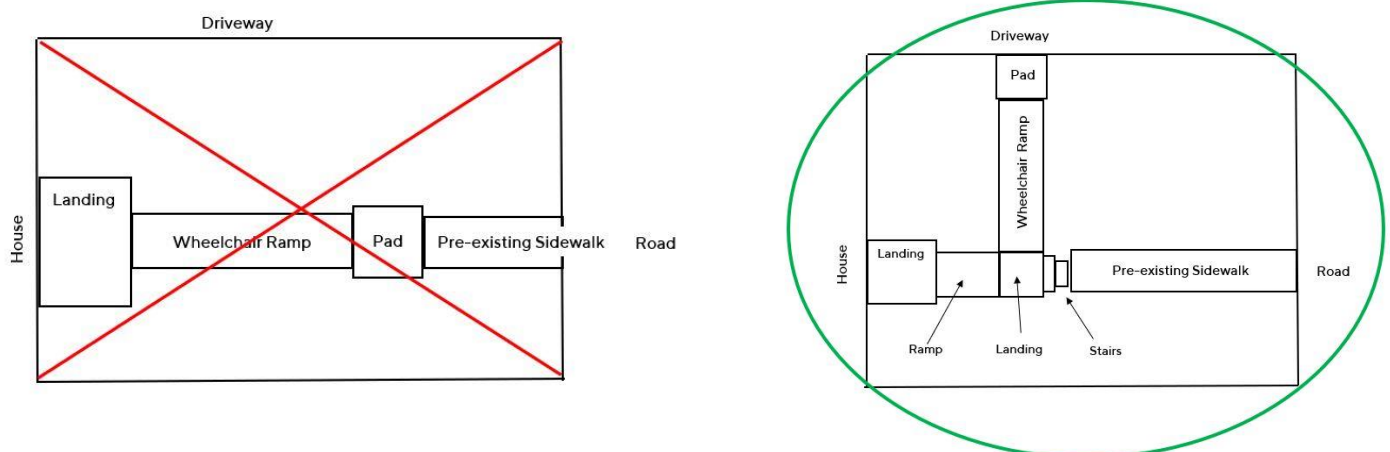
- Ramps should have a minimum clearance of 36" between handrails to allow for maneuvering. If you set your 4x4 posts 39" apart from one another, this will allow you to efficiently use 8' lengths of lumber and give you a 36" clearance.
- Always call to check the ground before you dig for utility lines and septic lines/fields.

Draw Our Your Design

Here are three possible layouts to build your ramp. Be sure to add measurements and make sure it will fit in the area you're working with.



Keep in mind where the individual in the wheelchair will need to get into a vehicle. The best scenario for this is the ramp connecting right to the driveway. You may need to create your own small path to obtain this. If the wheelchair ramp connects to a sidewalk that requires them to go on the street to get to their parking pad- this is not a safe design.



Buying the Ramp Materials

Here are some tips to make this process easier:

1. There is a Wheelchair Ramp Formula & Purchase List on the Training Website. This will quickly tell you how much lumber and other supplies you will need for the project.
2. Always use treated lumber for wheelchair ramps. Treated lumber is more durable and will be safer for the operator.
3. You should estimate your ramp cost to no more than \$40 per square foot, including the landings. Be mindful of your budget. Just because you have money to spend, doesn't mean you have to spend it.
4. Use the Training Resources as a guide to plan your purchases at the hardware store.
5. Purchase all ramp material prior to participants arriving on site. It may be smart to keep the materials in your vehicle so when participants arrive, they can unload everything while you get your thoughts together to begin the project.
6. When purchasing the materials, do not go for the most expensive materials at the store. You can get the same quality materials and lumber for a cheaper price. However, for some materials, you should not substitute price for quality.

Building the Ramp

Once you start unpacking materials and getting them where they need to go, be mindful of what materials are used where. For example, do not use one of your 2x6 stringer boards where a 2x4 handrail is supposed to go, or else you will need to spend additional funds to replace the material.

There are two ways to build the ramp. The first is in modules (this is the method described in this manual). This method is easier to manage participants and delegate tasks. This is when the framed, un-decked ramp and landings sections are built as individual units then added to the ramp once the posts are set. The second would be to "stick frame" the ramp. This involves adding all the framing pieces as you go. This may take longer and will be hard to manage the participants but can be easier to solve the problems that occur in modular framing. It will be up to you to determine how to build your ramp.

Laying Out and Setting Posts

Here are the steps to get you started:

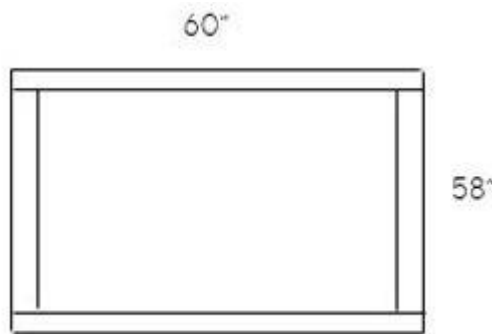
1. Once you know the total distance in ramp length and determined a design for the ramp, build the first 60" x 58" landing frame on a level surface.
2. From the middle of the exterior door's threshold, measure along the wall 30" on each side. Mark the ground with spray paint. Straight out from the house, at a 90-degree angle, measure out 58" from both marks. Temporarily mark the ground with something other than spray paint. Measure the distance between the two temporary marks. Move the marks until they are 60" from each other and still 58" from the wall. Once you are sure you are square, make the ground with spray paint.
3. Dig your footings on the spray paint marks so they reach below the frost line. The exact frost line depends on the area, you can google to frost line in your area- but generally, this will be about 32"-40".
4. For this step, you can either place the posts in the ground and use Quickrete concrete bags to pour around the post, or you can buy a pier forming tube to place in the ground (Sonotube), then place the post in the forming tube, then fill with Quickrete. Be sure to

brace each post and make them plumb and square with each other. *Begin working on the ramp the day after setting the concrete at the earliest.*

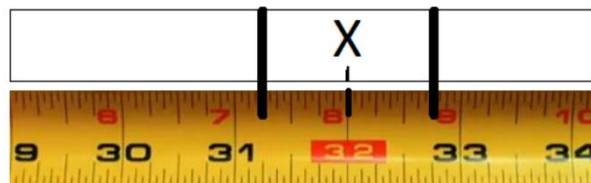
5. Be sure to brace the posts on two sides while the concrete sets so your post is plumb. A post that is not plumb will cause many problems later on.

Building the Landings

1. Split your crews into three or four smaller groups. Have two groups start building the frame for all the ramps and railings, one group will be in charge of cutting lumber to the correct size, and the last group will be in charge of digging holes for the posts (if not set already).
2. The first and top landing should be 60" x 58" and made of 2x6's. The two longest boards should be 60". Cut two more boards 55" and fit them between the longer boards. Nail/screw the boards together so you make a square. Be sure to make the top and bottom of the boards flush with each other so there is no hump in the decking.



3. From the edge of both 60" boards, measure every 16" until the end of the board. You will be making a mark at 16", 32" and 48" (your tape measure will have every 16" already marked for you in red (as shown below). Measure every $\frac{3}{4}$ " on each side of every mark, and then mark an X in the middle.



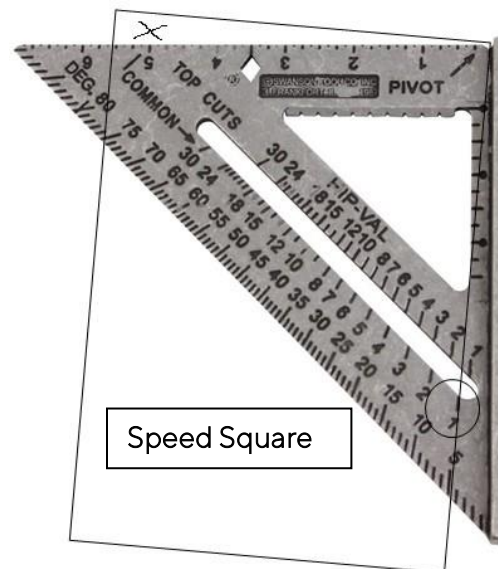
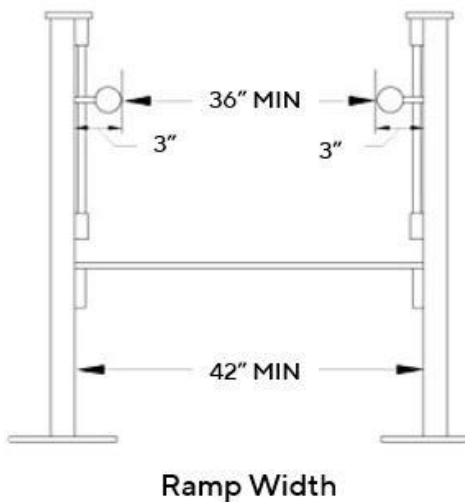
4. Cut three more boards to 55" and place them perpendicular to the 60" boards between the marks you just made. Screw the boards in place making sure the top of the boards are completely flush. *This is how all top landings and 90-degree landings should be framed.*
5. Switchback landings should be built the same way, just with different dimensions. However, since decking will need to run perpendicular to the trusses in the framing, you will only cut two 58" boards and mark every 16" on both boards.
6. The five boards to go between the end boards should be 93" 2x6s. You can make all these from full 8' pieces of 2x6s.
7. Once the landing is built, you are required to place 2x6 galvanized joist hangers on the ends of the inside joists. To attach the hangers, use 1-1/2 N10 hanger nails in all holes of the hangers.

Setting the Top Landing

1. Before lifting the ramp module, make sure you have enough people to lift it without anyone getting hurt. Also, be sure you are completely ready to set it in place.
2. Measure $\frac{1}{2}$ " below the door threshold and make sure it is level in all directions.
3. Get a piece of string (long enough to reach all 4X4 posts) with a line level in the middle. Put one end of the string on the $\frac{1}{2}$ mark and the other on each of the 4x4 posts. Before you make a mark on the 4x4s, make sure the string is tight and is not sagging in the middle. Raise or lower the end of the string on the post until the string is level.
4. Once the string is level, make a mark on the 4x4 posts where the string meets.
5. When you have marks on all 4 posts closest to the door, you are ready to set the top landing in place. You should have at least 4 people lift the landing at once. Have 2 people (other than the ones holding the landing) set the landing in place.
6. Make sure the top of the landing is on the marks made with the line level. Use a 3" screw to hold the corners of the landing in place **temporarily**.
7. Once you verify all four corners are on their marks, use a 4' level and double check that the landing is level. Adjust where needed.
8. At each corner, use a $\frac{1}{2}$ " spade bit to drill a hole straight through the 4x4 posts and the 2x6s. Once drilled, push a $\frac{1}{2}$ x 8" carriage bolt through the hole. You may need to use a hammer to get it all the way through. Put the bolt in from the outside, then place a washer on the inside followed by a nut. Tighten the nut and repeat for the other three corners.

Building the Ramp

1. Building the ramp module is done in the same process as the landings; the only two differences are the length and the ends of the module. The width of the ramp should be 42" from the outside of the 2x6 frame. This will give you enough space to place a handrail inside and clear the required 36 inches.



2. Cut two 2x6 pieces to 49". These will be your end boards.
3. Use a speed square to cut a 12:1 angle cut at the very end of a 2x6.
4. From the longer side of the cut 2x6, measure the length of the ramp module. Be sure to subtract 3" off the measurement to make up for the widths of the two end pieces.
5. Cut the other end of the 2x6 so the top and bottom side of the lumber are the same length. The 2x6 should look like a parallelogram.

6. Do this three times for the two side boards and the board that runs in the middle.
7. Once all ramps are built, you are required to place 2x6 galvanized joist hangers on the ends of the middle joist. To attach the hangers, use 1½ N10 hanger nails in all holes of the hangers.

Setting the Ramp

1. Once the ramp is built and the top landing is installed, you may now set the first ramp. To do this, have several people carry and hold the ramp piece into position. It is important to make sure the top of the ramp is completely flush with the landing. If there is a difference, it will be noticeable when laying down decking.
2. To attach these, drill two 2½" screws through the end of the ramp to the top of the landing. **These are temporary.**
3. Using a spade bit, drill one ½ inch hole on each side of the middle beam all the way through. Drive a 6" carriage bolt through the holes, place a washer and bolt on the end, then tighten.

Decking

1. Now install the decking. The decking material should be screwed down to the joists to prevent the boards from lifting over time. Use a composite material, you'll minimize maintenance and lower the probability of having to replace the boards.
2. Decking should be placed perpendicular to the joists. Get two screws on each side of every board. Screws should be driven straight down, not at an angle.
3. Space your decking boards 1/16 to 1/18 inches to allow for water drainage.



Handrails

1. The 4x4 posts are used as a structural support as well as the railing posts. ADA gives requirements for railing height, hand-hold specifications, spindle placement and other safety features.
2. If your ramp section is further than 8 feet, you should consider adding a center post at the center of the ramp section.
3. The easiest way to install the handrails is to make the top 2x4 flush with the top of the 4x4 posts set at 34" from the top of the decking boards.
4. Measure 7" up from the top of the decking and run the top of another 2x4 with the mark you just made. This board is to prevent the wheelchair from rolling off the edge.

5. Measure the distance between the handrail and the roll off protector board. From the middle of those boards, measure 3 ½" up and place a 2x4 mid-rail flush to the top of that mark.
6. Screw each of these rails in with 2 ½" or 3 ½" screws. There should be two screws per 2x4 per 4x4 post. To prevent your 2x4s from splitting, drill a pilot hole where the screws will go and then slightly countersink your screw.

