

Michigan Accessible Homes

RAMP DESIGN

The first and most critical aspect of an accessible home is getting into it. Usually, there are one or more steps up to an entrance, which make getting into the home difficult or impossible for a person using a wheelchair. Since we recognize that not everybody can hire an architect to custom-design a ramp for their house, we offer the following information which may help you get started.

Basic Ramp Design Considerations:

1. *Which door will the ramp lead to?*
 - a) Front Door:
 - i) Readily available to you and to guests.
 - ii) Front door is usually widest door in house (36" wide is recommended for wheelchair passage).
 - iii) Since the ramp is so visible, it makes it obvious that a person with a disability lives in the house.
 - iv) Often results in the ramp encroaching on the front setback or yard, an area in which zoning codes generally do not allow permanent construction. Many municipalities make an exception for ramps, but check with your local building department before you start work. A permit will probably be required.
 - b) Garage Door:
 - i) Ramp is inside, protected from weather, so it's less slippery and requires less maintenance.
 - ii) May be less rise (which means a shorter, cheaper ramp) from the garage slab to the inside of the house, than at other locations.
 - iii) Difficult to anchor ramp and guardrails to garage slab, so guardrails especially may be less stable.
 - iv) Ramp may use up enough space that the garage accommodates one fewer car than it did before.
 - v) Guests needing the ramp may come into a less attractive part of the house.
 - c) Rear Door:
 - i) May be able to take advantage of an existing deck for the upper landing.
 - ii) Door is often a sliding door or French door with a high threshold; it also may not be designed to lock and unlock from the exterior.
 - iii) Check the route from your vehicle to be sure you can get out of the garage and to the ramp easily.

2. ***What material will be used to construct the ramp?***

- a) Pressure Treated Wood:
 - i) Most common choice for residences.
 - ii) Needs regular maintenance (every couple years) to keep wood looking fairly attractive.
 - iii) Easier for homeowners to construct, or any contractor familiar with deck construction.
 - iv) Requires hot-dipped galvanized or stainless steel fasteners. Current pressure-treating chemicals will corrode other fasteners in very short times. Screwed or bolted connections will be much more durable than nailed connections.
 - v) Use materials rated for ground contact for posts and any other parts touching the ground.
 - vi) Strongly recommend composite decking (Trex or similar). Plywood is very slippery when wet, and treated 2x's will often cup or splinter.
- b) Concrete:
 - i) Strong, stable, slip-resistant, and requires little maintenance.
 - ii) Generally more expensive to construct.
 - iii) Usually uses metal guardrails, but can work with wood as well.
 - iv) Difficult to remove if you (or a later homeowner) want to change the ramp.
- c) Aluminum:
 - i) Usually used for portable ramps; more expensive than wood ramps but have the benefit that you can take them with you if you move.
 - ii) Portable ramps can also be purchased or rented; check with your DME (durable medical equipment) supplier or the Yellow Pages, or do a Web search on modular ramps.
- d) Other options:
 - i) Cedar or other naturally durable woods: More expensive than pressure treated, but also more attractive. Generally still need maintenance.
 - ii) Plastic or other composite lumber: Low or no maintenance but generally much more expensive. Most often used for decking; structural grade pieces are available but much less common.
 - iii) Plywood: Generally best avoided, even if it is pressure treated. Plywood tends to delaminate (come apart) and is usually very slippery when wet.

3. ***Basic Ramp Design and Construction:***

- i) Ramps should not be steeper than 12 feet of horizontal run for one foot of rise (1:12 slope). Even this will be difficult for many people to use, especially with manual wheelchairs, and with larger rises resulting in more effort. 15 feet of run (or more) is recommended for every 1 foot of rise (1:15 slope). Slopes steeper than 1:10 or so can cause a wheelchair to tip backwards.
- ii) If your actual rise is more or less than one foot, multiply the actual rise by the desired slope. For instance, a two foot rise with a 1:15 slope would require $2 \times 15 = 30$ feet of run. A 6" rise (1/2 foot) with a 1:12 slope would require $1/2 \times 12 = 6$ feet of run.
- iii) If the slope of the ramp is shallow--1 foot of vertical rise (or less) for each 20 feet of horizontal run, then no additional provisions (such as handrails) are usually necessary. In such cases, the best method is probably a slightly sloping concrete

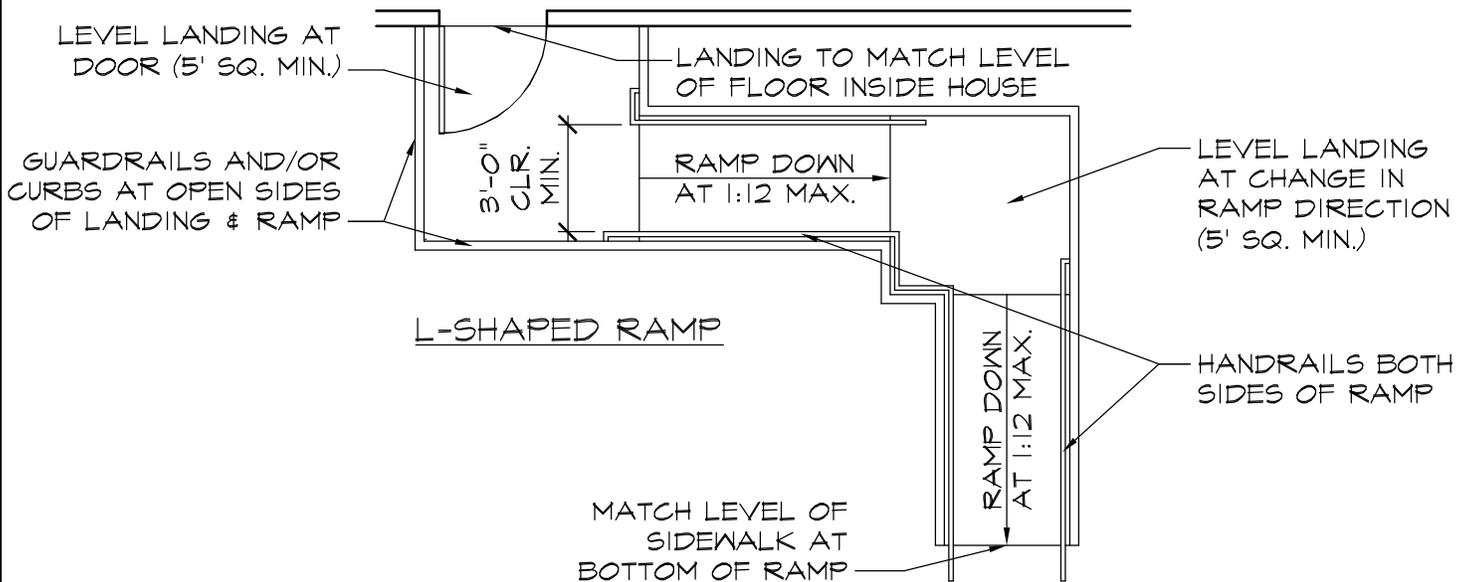
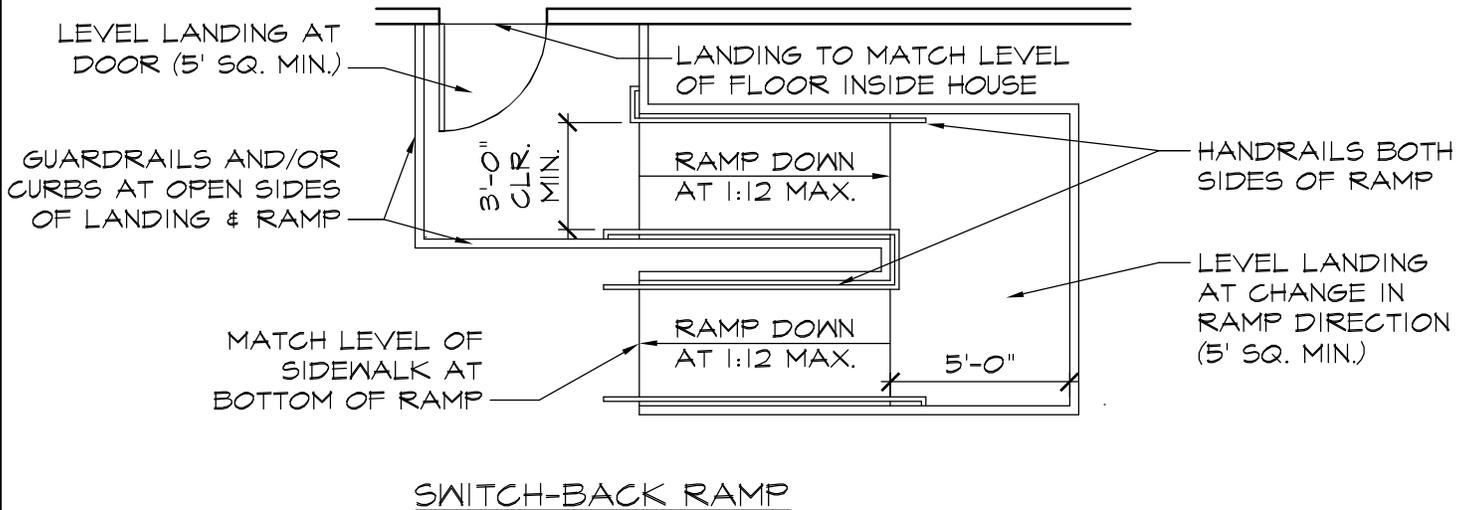
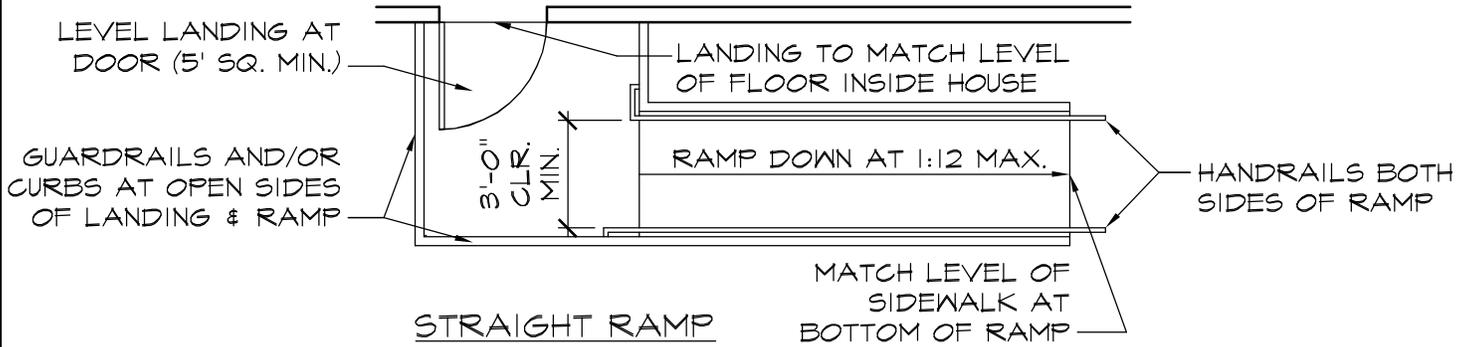
- sidewalk. A light broom finish, applied perpendicular to the direction of travel, will improve traction.
- iv) Ramps should be at least 36" wide (clear between handrails). Level landings, at least 60" long, should be provided at the top and bottom of the ramp, and 60" x 60" landings should be provided whenever the ramp changes direction. Intermediate landings, at least 60" long, should be provided for every ramp with 30" of rise or more.
 - v) "Level" landings aren't usually completely level, so that water drains off them, but should not slope more than 1/4" per foot (1:48).
 - vi) Handrails are recommended on both sides of any ramp with a rise greater than 6". The top of the handrail should be 34"-38" above the ramp. Handrails should be 1-1/2" from walls or posts (to allow fingers to wrap around the rail), and should have a gripping surface with a diameter of 1-1/4" to 1-1/2". In my experience most people in wheelchairs don't use the handrails, but ambulatory users will.
 - vii) Ramps should have some sort of non-slip surface.
 - a) For concrete ramps, provide a broomed finish before the concrete is set: use an old broom to sweep across the width of the ramp, heavy enough to provide a slight texture.
 - b) For wood ramps, composite decking (Trex or similar) is best. Otherwise, sprinkle sand on the ramp prior to sealing or painting, or apply roofing paper or abrasive strips to the ramp surface. Additives to add texture to paints to make them less slippery are also available from paint stores. The texture will probably need to be redone every couple years.
 - viii) Provide a curb, wall, or vertical guardrail along both sides of the ramp. This will prevent wheels from rolling over the edge.
 - ix) Although you can save some money (by eliminating a guardrail) by building the ramp tight to the house wall, supporting the ramp properly off the house can be very difficult. We generally prefer the ramp to be self-supporting (off posts set in separate footings).
 - x) At the foot or base of the ramp, a smooth transition from the wood ramp to the sidewalk is important, and is difficult to do well with wood. Provide either a sloped concrete section at the bottom of the ramp, or use a metal (aluminum or stainless steel) plate for a smooth transition.
 - xi) The completed ramp should be cleaned with a cleaner/brightener that contains a mildewcide, then treated with a clear wood sealant designed for use on new pressure treated wood, and containing a water repellent and a UV stabilizer.
 - xii) Contact MISS DIG (1-800-482-7171) prior to excavating foundations for ramp supports. MISS DIG is sponsored by local utility companies; they will come to your home and locate any existing utility lines so you don't accidentally hit one when digging foundations.
 - xiii) Contractors for residential projects are required to be licensed by the State in order to obtain permits. Ask for their license number to be sure you get the protections provided under state law.
 - xiv) While ramps are required for some people, others find stairs easier to use. If at all possible, it is preferable to have both.

- xv) Even the best-designed ramp requires maintenance. Be sure to keep the ramp clear of snow and ice, and reapply the surface texture as needed to keep the ramp from being too slippery.
- xvi) Ramps take up large amounts of space. Tight situations or very high main floors may require consideration of a wheelchair lift. Contact Michigan Accessible Homes or your contractor for additional information.
- xvii) While the main ramp is usually at the front door or at a rear deck, many people install a second ramp from their accessible bedroom for quicker exit in case of fire or other emergency.

4. *Which layout fits your available space, and provides the most direct connection from where you get out of your vehicle or arrive at the house, to the door you want to go in?* See the following pages for diagrams.
- a) Straight ramp: Simplest option, least expensive. For very long ramps (30" rise or more), put a level landing in the middle for a place to rest.
 - b) Switchback ramp: Provides a landing in the middle, then reverses direction.
 - c) L-shaped ramp: Provides a landing in the middle, then turns 90 degrees.
 - d) For either the switchback or the L-shaped ramp, the sections of ramp can be the same length, or different depending on what works, as long as no section is more than 30 feet long.
 - e) Of course the angles between sections can be varied depending on what fits your circumstances and preferences.

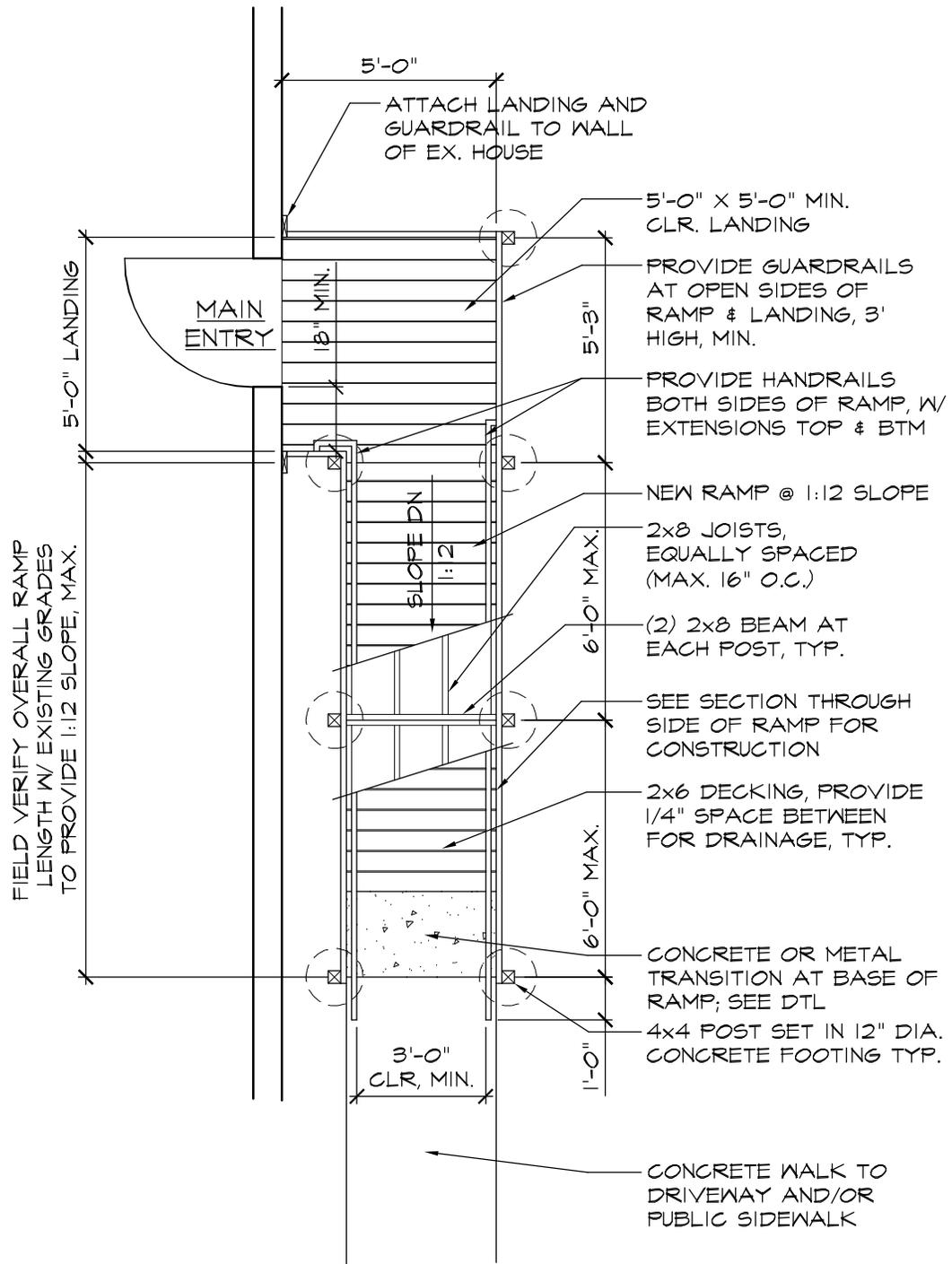
The following pages show basic ramp layouts, as well as typical construction details. Please bear in mind that this is general information, not tailored to a specific location. The ramp details are ones we have used before in several locations, and they result in a ramp which is strong and stable, and we believe it complies with applicable codes in Michigan for single-family residences. However, you or your contractor should check with your local code official to be sure there are no unusual local requirements, and should adapt the designs to your particular circumstances. We have seen many ramps constructed by builders or homeowners which are much less stable or even unsafe, so be careful with considering low bids for ramp design.

Since this information is being provided free of charge, by using it you agree to indemnify and hold harmless Michigan Accessible Homes, Cornerstone Design Inc, and their owners and employees for liability resulting from the resulting construction. Please note also that this information is intended for single family residences only; multi-family (apartment or condo) locations and commercial facilities like offices or stores have different requirements, and generally require an architect's or engineer's seal to get building permits. Please contact us at 734.663.7580 if you need designs for a commercial or multi-family project, or if you would like complete designs for a custom ramp for your home.



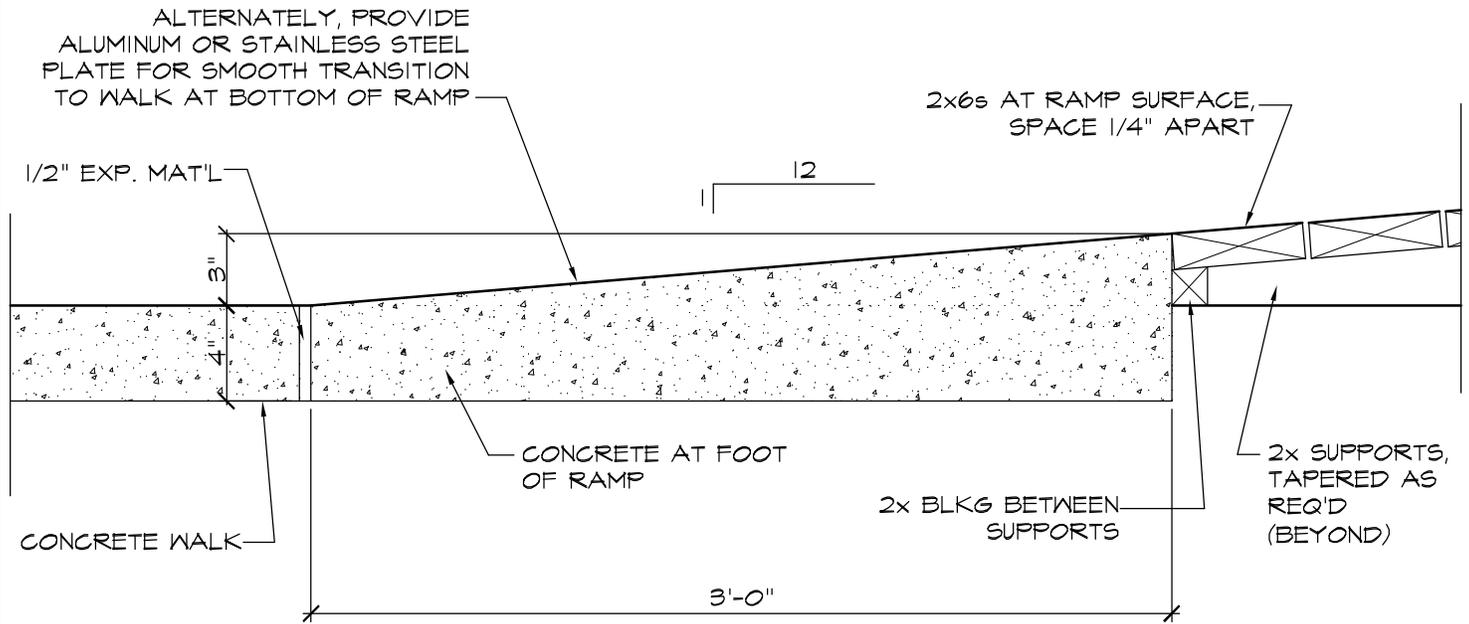
Typical Ramp Layouts

3/16" = 1'-0"



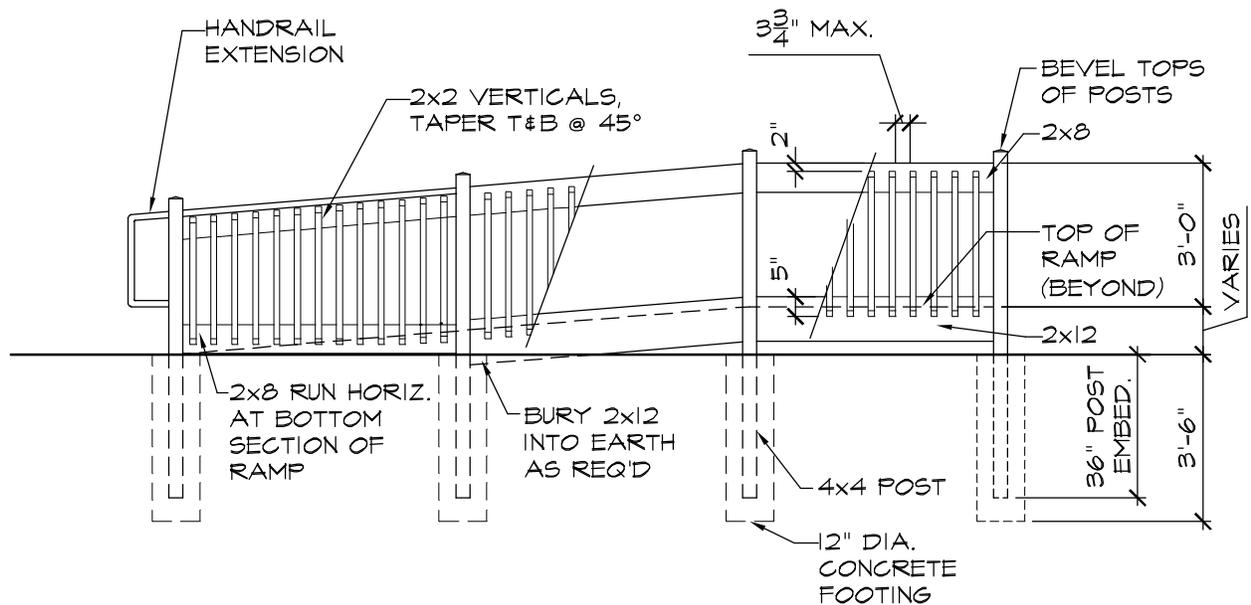
Ramp Construction Plan

1/4" = 1'-0"



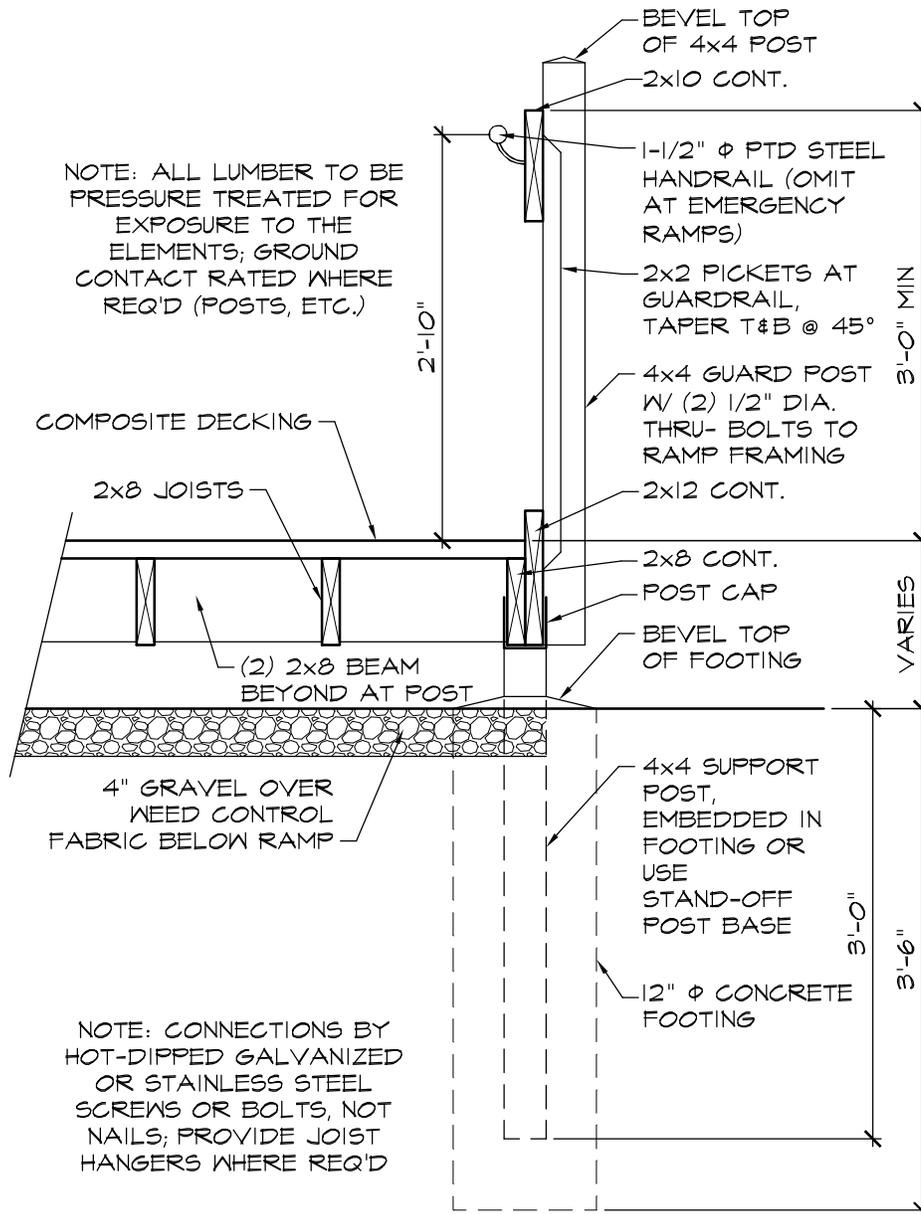
Detail at Bottom of Ramp

1-1/2" = 1'-0"



Ramp Elevation

1/4" = 1'-0"



Ramp Section

3/4" = 1'-0"