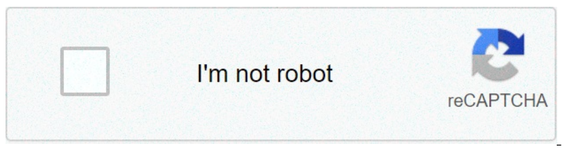

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How to build a gabion retaining wall

When you contemplate how to build a retaining wall, you may imagine how firm and solid it’ll appear from the front, or how great the new garden will look above it. But unless you give serious thought to what goes on behind and below the wall, the retaining wall design may not look good for long. A poor retaining wall design wall can lean, separate, even topple — you don’t want that!Lots of people think a retaining wall needs to hold back all 6 gazillion tons of soil in the yard behind it. It doesn’t. It only needs to retain a wedge of soil, or elongated wedge of soil, similar to that shown in the image below.In simple terms: Undisturbed soil — soil that has lain untouched and naturally compacted for thousands of years — has a maximum slope beyond which it won’t ‘hang together’ on its own. This slope is called the failure plane. If left alone, the soil behind the failure plane will stay put on its own. But the soil in front of the failure plane — the natural soil or the fill you’re going to add — wants to slide down the failure plane.Family HandymanGravity, along with the slope, directs most of the weight and pressure of the fill toward the lower part of the retaining wall. Since soil weighs a beefy 100-plus lbs. per cu. ft., you need some pretty heavy material — large retaining wall blocks, boulders, timbers or poured concrete — to counteract the pressure. Just as important, it needs to be installed the right way. Here are three key principles in building any solid retaining wall:Bury the bottom course, or courses, of the retaining wall one tenth the height of the wall to prevent the soil behind from pushing the bottom out.Step back the blocks, rocks or timbers to get gravity working in your favor. This lets the walls lean and push against the fill. Walls built perfectly vertical get gravity working against them the second they start leaning outward even just a bit. Most concrete retaining wall block systems have some kind of built-in lip or pin system that automatically creates the step back as you build.Install a base of solidly compacted material so your wall stays flat. A level wall provides modular blocks, stone and timbers with more surface contact with the courses above and below them. They fit together more tightly. The more contact, the more friction and the stronger the wall. Apply these three rules, and you’ll create a strong wall. But even a well built wall won’t survive unless you take care of two troublemakers: water and uncompacted soil.Uncontrolled Water Weakens WallsWater can weaken retaining walls by washing out the base material that supports the wall. But far more frequently, it causes problems by building up behind the wall, saturating the soil and applying incredible pressure. That’s when walls start leaning, bulging and toppling. Well built walls are constructed and graded to prevent water from getting behind the wall and to provide a speedy exit route for water that inevitably weasels its way in.Take a look at the well-drained wall below on the left. The sod and topsoil are almost even with the top block, so surface water flows over the top rather than puddling behind. Just below that is 8 to 12 in. of packed impervious soil to help prevent water from seeping behind the wall. The gravel below that soil gives water that does enter a fast route to the drain tile. And the perforated drain tile collects the water and directs it away from the base of the wall, escorting it out through its open ends. There’s nothing to prevent water from seeping out between the faces of the blocks, either; that helps with the drainage too. The wall even has porous filter fabric to prevent soil from clogging up the gravel. What you’re looking at is a well-drained wall that will last a long time.Now look at the poorly drained wall below on the right. There’s a dip in the lawn that collects water near the top of the wall. There’s no impervious soil, so the water heads south, slowly water-logging and increasing the weight of the soil packed behind the wall. The homeowner put plastic against the back of the wall to prevent soil from oozing out between the cracks — but it’s also holding water in. Yikes! There’s no drain tile at the bottom — the trapped water can soak, soften and erode the base material. Not only that, an excavated trench that extends below the base lets water soak into the base material and weaken it. You’ve got a retaining wall that has to hold back tons and tons of water and saturated soil — and when that water freezes and expands in the winter, matters get even worse.Family HandymanA Well-Built WallA strong retaining wall design features well-compacted base material, compacted material in front of the wall to prevent kick-out, and stepped-back materials.Family HandymanA Poorly Built WallA wall that has an uneven base, no compacted material in front of it and no step-back to the materials will eventually fail.Family HandymanPoor Compaction Adds Pressure to WallsEven if you have only a small wedge of soil to retain, compaction is important. If your failure plane is farther back so your wall needs to retain more fill, weight and pressure, then compaction and a reinforcing grid become critical. These two things help increase internal friction and direct the pressure of the fill you add downward, rather than at an angle pushing against the wall. Good compaction doesn’t mean dumping a couple of feet of fill behind the wall, then jumping up and down on it in your work boots.Good compaction means adding 3 or 4 in. of material, compacting it with a heavy, noisy vibrating plate tamper from your friendly neighborhood rental yard, then repeating these steps over and over. Your landscape supplier or block manufacturer (if you’re using modular blocks) can tell you whether you need to install reinforcing grid, and at what intervals. The taller the wall, the more likely you’ll need reinforcing grid.Family HandymanWhen building a retaining wall, never backfill with, or compact, topsoil; it will break down and settle, creating a water-welcoming trench behind your wall. Use sandy or gravelly materials, which compact much better. And always make certain you don’t become overzealous and compact your wall outward.Timber Walls, Tall Walls, Building Codes and Other StuffBy themselves, landscape timbers and a railroad tie retaining wall lack the weight to hold back soil. To make these walls strong, you need to add “dead men,” anchors that lock the wall into the soil behind them. The same pressure that’s pushing against the wall pushes down on the dead men to keep them (and therefore the wall) in place. The principles of stepping back, installing good drainage and compacting also apply to timber walls.Family HandymanWalls of any material that are taller than 4 ft. play by the same rules — it’s just that the wedge of soil is too big and heavy to be held in place by the weight of the materials alone. Some communities now require building permits and construction details for walls exceeding 4 ft. in height. We think that’s a good idea too. Many modular block manufacturers can supply printed sheets of structural information.For tall slopes, a series of tiered walls is a good substitute for a single tall wall. But an upper tier can apply pressure to a lower tier unless it’s spaced the proper distance—you know, behind the failure plane. The rule of thumb is to set back the upper wall twice the height of the lower wall. Retaining wall with curved 90° outside corner.Constructing corners can be tricky when building retaining walls, since some types of blocks aren’t square and may not be textured on all sides. That’s why it’s important to consider your corners and curves carefully when choosing the type of block to buy for your retaining wall.Some types of blocks come with corner units that make the job easy, and others are finished on all sides so the corners can be exposed. When choosing and buying blocks, make sure you have the accessories and instructions for whatever corners, curves, or special circumstances you have in your plan.Here are some tips for tackling corners in your retaining wall project.Retaining Wall Corners Using One-Sided BlocksThe most common blocks for retaining walls are textured only on one side, with a lip at the back that butts up against the row under it. They’re often wedge-shaped to allow for turns and curves. This type of block is designed more for curves than sharp corners, since only one side of the block is meant to show.To construct retaining wall corners using wedge-shaped blocks:Outside Corners: Most retaining wall outside corners built with wedge-shaped blocks are curved, rather than a 90° angle, since it’s impossible to make an outside corner without showing the cut (and unattractive) end of the blocks. Wedge-shaped blocks are easily laid in a curve, or you can cut the sides of rectangular blocks to achieve the same curved effect.Inside Corners: It’s easier to construct 90° angle inside corners with wedge-shaped blocks, since the backs and sides of the blocks won’t show. Start the first row in the corner, then overlap the joints in each additional row of blocks, cutting any odd sized blocks to fit.For 90° angle outside corners, use blocks that are finished on two or more sides.Retaining Wall Corners Using Corner UnitsIf you’re using stackable blocks that are only textured on one side, the best solution is to choose a block system that comes with corner units. The corner units are finished on two sides and connect to the adjoining blocks to form a 90° angle.Each system is designed differently, so each type of corner unit will have slightly different installation instructions. In general, you’ll start at the corner and work your way out, beginning with a corner block that alternates facing right and left on each row.Use masonry adhesive when constructing a 90° outside corner on a retaining wall.Retaining Wall Corners Using Multisided BlocksIf your retaining wall blocks are rectangular and finished on at least two sides (like many pavers and cinder blocks), you can easily stack them to create a corner. Alternate the pattern to divide the load and keep the corner from splitting, and be sure to use some masonry adhesive to hold the corner pieces in place: Further InformationRetaining wall systems and corner installations: Photo: shutterstock.comRetaining walls offer aesthetic as well as practical benefits: In addition to beautifying the home, they inhibit soil erosion and provide privacy to outdoor living areas. Retaining walls even boost home value, rewarding homeowners with a favorable return on investment more often than not.Retaining Walls MaterialsIf you are planning to build a retaining wall, you may choose from a wide range of materials. Which material is best for your wall depends on a few variables: your personal style sense, the project budget, and the nuances of the site in question. Homeowners who are building a retaining wall often use one of the following materials.Interlocking concrete blocks. Available in many shapes, textures, and colors, interlocking concrete blocks are mortar-free, cost-efficient, and highly durable, offering both fire and water resistance.Railroad ties. An inexpensive option, railroad ties have a significant downside: they are clunky to work with, requiring a labor-intensive degree of sawing and drilling.Natural stone. This is the most expensive of all—at least initially. Over its very long life span, however, a natural stone retaining wall needs little maintenance.Brick. Very durable, brick delivers a refined look, but at a price—the cost of materials is higher than for most other options, and for best results, it’s recommended to hire a professional.Cinder block. The primary selling point of cinder block is its low price. Although it’s not very attractive on its own, cinder block can be painted or surfaced in stucco.Concrete. Unadorned concrete can look pretty utilitarian, but it can be beautified with paint or even stone veneer. While retaining walls of this type are relatively inexpensive, they can be difficult to repair or remove.Find trusted local pros for any home project + Building a Retaining WallFor the average do-it-yourselfer, building a retaining wall is easiest when using masonry blocks that will be stacked no taller than three feet, with no mortar binding the stones or concrete members. Certainly, experienced amateurs are capable of completing more complex masonry installations or of building retaining walls using other materials, but novices with such ambitious goals are encouraged to work with an experienced landscape design contractor.Start by marking out the site where you intend to build the retaining wall. For this task, use wood stakes and a mason’s line. (For a curved wall, mark instead with a garden hose or spray paint.) Remove all loose debris and plant material, including grass, from the designated area.Photo: shutterstock.comWith a shovel, dig a trench to accommodate the bottom of your first masonry row. The trench must go down one inch for every eight inches of planned wall height. So if you are building a retaining wall that is three feet tall, then four and a half inches of the initial masonry course should sit below grade.Line the back and bottom of the trench with landscape fabric, then set a perforated drain pipe along its length. Add four inches of gravel, leveled and tamped down, followed by one inch of bedding sand.Up to this point, you’ve been making the base upon which the retaining wall is going to stand. Now it’s time to build the actual wall, one tier a time. Fit the stones or concrete members together as closely as possible. As you finish each row, shovel in gravel as backfill; doing so not only strengthens the wall but also promotes drainage. (Another way to prevent moisture buildup is to add weep holes at the foot of the wall.)Stagger succeeding courses of masonry so that the wall leans slightly toward the hill against which you are installing the wall. By building the wall on a backwards slant, you counteract the effect of gravity.Further stabilize the wall by planting flowers and small plants along its top. The roots help hold the soil together, and the vegetation offers the peripheral benefit of blending the retaining wall with its surroundings. Avoid planting trees and bushes close to the masonry, as their migrating roots can easily weaken the wall you worked so hard to erect.Find trusted local pros for any home project + This site is not available in your country This site is not available in your country If you have a sloping or uneven landscape, building a retaining wall can help to stabilize the soil. The wall helps to consolidate the ground and prevent erosion through the redistribution of lateral pressure caused by the slope. Concrete, bricks, wood, stone or railroad ties are some of the materials commonly used to build the wall. For greater erosion control, you can opt for a stair-like design. Different materials or plants can be placed on each separate level for a more attractive appearance. A well built retaining wall helps to enhance your landscape considerably. You want to make certain that you avoid some common mistakes as you construct your wall.For safety considerations, it is best not to construct a wall that exceeds a height of 6 feet. Walls that exceed this height are unlikely to remain stable. Higher walls require additional structural support such as vertical support posts or guard rails. The higher the wall, the more likely it is that it will lean and collapse in the near future.Uneven GroundIt is vital that you strive to ensure a level surface for your wall from side to side. This contributes to the resilience and long-term stability of the wall. Levelness must be upheld from the moment you excavate. Be sure to make the bottom of the trench as level as possible. A tamper and level can help you create an even and solid surface. Compact the soil thoroughly, so that you have a level foundation. This makes it easier to line up your blocks or other material used in construction.Failure to Backfill Each LayerWhen you backfill each layer, it gives the wall substance. It also creates a downward drainage path which enhances proper drainage. The backfill gives the wall higher resilience, as it draws support from the slope to hold the wall in place. Suitable materials to be used as backfill are pea gravel, sand or leftover soil.LayeringDo not build your wall to be perfectly vertical. It is best to set each layer back by about ½ an inch. This creates a wall that is slightly inclined towards the back. A back-leaning wall has a higher capacity to counter the pressure of the earth behind it. This adds to the durability of the wall. A perfectly vertical wall is more likely to succumb to the pressure of the earth behind it, and will disintegrate in a shorter period.Improper DrainageIt is easy to overlook drainage when building a retaining wall. Proper drainage ensures that water does not accumulate behind the wall. Accumulated water tends to freeze during cold weather. This causes the soil to expand and misalign the top of the wall. Higher lateral pressure tends to weaken the wall which eventually collapses. To counter this, create a drainage path for the water when you build the bottom layer of the wall. Leave some small spaces in between the construction material, to allow the water to flow from behind the wall. You could also install a perforated pipe at the base of the wall. Cover the pipe with small stones or gravel so that it doesn’t get clogged. Thereafter, you can add soil and compact it.

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