

In-Ground POOL



Building an in-ground pool can be a rewarding experience, and less daunting than you first imagine. Swimming pools today are manufactured from a variety of materials, and (some) are engineered to be almost easy to install. We will **not** cover building a concrete pool because a homeowner generally will not be able to install a concrete pool as it requires knowledge and tools beyond the scope of most homeowners. Our project is a vinyl liner pool with cement bottom and structural

plastic walls. The walls of today's pools are made of various materials that are assembled like a giant erector set. The pool manufacturers make the sides from aluminum, galvanized steel, plastic, and fiberglass. All of these materials are acceptable.

Step 1: Determine the answer to a variety of questions before you start. (see last pages for a discussion of these points and others)

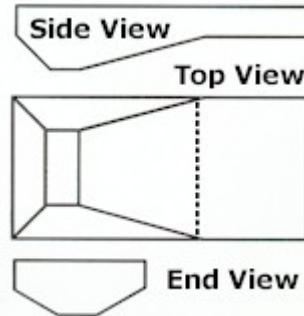
- Pool location.
- How much fall the land has within the pool area.
- How deep you want your diving end to be.
- How high out of the ground the finished pool deck be.
- Local building code and permit requirements.



Step 2: Mark off the outline of the pool with stakes and string so that you can do fine tuning of final pool placement. Call for underground utilities to be marked (free service) so that you will not dig or trench through a buried cable or line. Secure your building permit. Determine supplier of pool and purchase pool kit, liner, Portland cement, vermiculite and all necessary supplies such as sliding board, pool vacuum etc. (These will be covered later)



Step 3: On the big day...start digging in the deep end. The pattern of the dig follows the diagram below. (which is a top, side and end view of the pool)



Step 4: The pool kit you purchase will provide the measurements for the final size of the pool bottom and sides. You will aim to **over dig** the sides of the pool approximately 24" bigger than your outline marked on the ground when you started. This provides working room for the panels, room for the panel braces shown in the picture to the right, and is where the concrete footer is poured that holds the bottom of the panel and panel braces.



Note: Our project in the photographs is a 6' deep Grecian style pool which has clipped corners. This changes the deep end bottom shape from that shown in our rectangular pool drawings above.

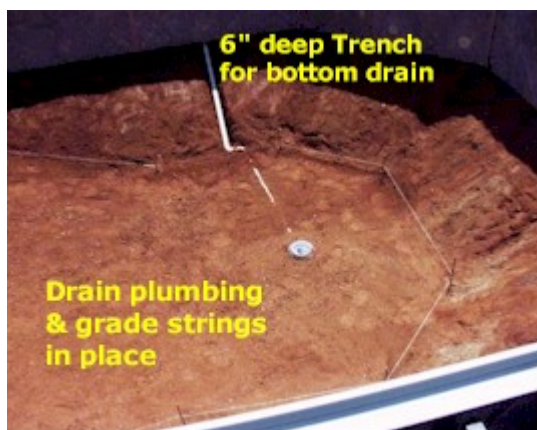
You will dig down **42"** for the pool walls and shallow end depth. The deep end is further excavated as shown in the picture on left. There is a 2' wide **shelf** outside the deep end as shown in both the picture and the drawing above it. The pool walls sit on the edge of this shelf and are held in place by 24" rebar stakes driven through the bottom.

After excavation is complete it is time to clean up the rough excavation and start assembling and placing the panels. Clean up the rough edges and make the 42" shelf and shallow end level and straight using a transit/builders level, and tape measure. Make sure the shelf and shallow end bottom are **level and flat**, as this is what the panels will sit on. If this shelf and pool bottom are 1" out of level, then your final pool will be 1" out when you are finished.

Step 5: Install panels. Use 2' long, 1/2" thick rebar as stakes through bottom of panels into ground to hold panels in place. Use spikes and string to make outline of pool for guide in assembling panels.



Step 9: While preparing the bottom in step 8, also dig out for the bottom drain in the center of the deep end diving well as shown in various pictures. Make the drain box 2" above the excavation level of the soil.



Step 6: After your satisfied the pool panels are level (you can shim up low spots with pieces of brick or block) then run string along the top of straight runs and adjust wall braces to make the top straight.

Step 7: Cut and install coping. This also helps keep long runs of wall straight.

Step 8: Prepare bottom for cement mix. Run strings along all bottom angle lines in the dirt as shown in photo above. Place the strings on large nails or spikes in the soil, following the final measurements you want your pool bottom to be. (these are the liner measurements provided by the pool kit supplier.) Now make sure there is 2" space below these strings. This is for the 2" of cement mixture you will be adding to make the bottom.

Step 10: Time to install your plumbing. Run 1 1/2" PVC plumbing lines. You will have 3 lines from the filter to the pool.

1. Wall line to pool (1 line, 2 wall outlets)
2. Bottom drain line
3. Skimmer return line

Your skimmer should be in the deep end (on the side), and if there are prevailing winds, it should be downwind so floating debris is helped toward the skimmer. Water return lines to pool should be located at opposite end of

pool from skimmer.

Step 11 Pour footer concrete. The footer locks the bottom of the wall brace (which by design locks the top of the wall) and the bottom of the wall in place. Depending on vehicle access, and how much you want to "pull" concrete, you may find a loader helpful in placing the concrete in the footer cavity as shown in our pictures. The footer should be 6-8 inches thick.



Note: In-the-wall steps are a popular feature and will replace some panels in your pool wall. They need to be supported underneath as shown in the instructions that come with them.

As shown in the pictures you can run your plumbing lines through the wall braces for support. Simply drill your inlet holes through the pool wall at approximately the height of the middle horizontal support on the wall braces. This way the PVC piping can sit on the braces until it takes the turn away from the pool toward the filter.



Step 12: Work begins on the bottom. This is easier than it looks. The bottom of a pool is not as flat as sidewalks and patios, so most homeowners can trowel out an acceptable 2" thick bottom finish.

Rent a mortar mixer (the largest one they have!) The mix ratio is 1 large bag of vermiculite (50lbs) to 94lb bag of Portland Cement, and 10 gallons of water. Vary these measurements to suit your needs, as you may need less or more water. Also, you will have to cut these measurements in smaller increments as mortar mixers cannot hold the batch size described above.





Start placing and finishing the 2" cement mixture at the deep end as shown. Start at the top of the diving well slopes, working your way toward the bottom drain. Use a wood or metal concrete finishing tool. The correct finish is smooth and flat....not beautiful.

Remove the grade nails and strings as you finish an area. Work your way out of the deep end toward the shallow end.

The cement mixture with the correct moisture content will look relatively dry when compared to concrete.

Note: Any pool building supplies that are not available from the supplier of the pool such as vermiculite, can be purchased locally from a pool contracting company. Portland cement and PVC plumbing lines are available at home centers, and building material stores.



If you have in-the-wall steps, curve the cement bottom up on the plastic front piece of the step unit with a 2" radius. In other words add extra cement where the step unit meets the bottom, and smooth it up the front wall of the step unit 2". The vinyl liner has trouble stretching into this bottom corner of the pool, so it is being filled in.



Step 13: Installing the liner is next. Your pool will probably be backfilled by this step. (unlike these pictures)

When you order the liner you will provide the critical measurements shown on our discussion page, and any other measurements they ask for. Normally each liner is custom made for each pool after the exact measurements are known. This allows you to have small variations in your actual layout.

Start at the deep end and pull out the entire liner. Align the liner by lining up a seam in the vinyl with the appropriate wall panel seam, and start hooking the top of the liner in the groove in the coping.



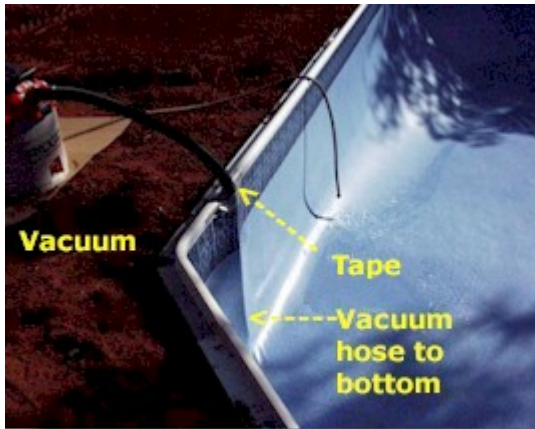
Pool kits and liner information:

You can find many choices on the internet for your pool kits, filters and vinyl liners. Here is one:

WaterWarehouse.com

After the liner is hooked in to the top, kick out wrinkles and tuck into corners as shown. The boxes used are the box the liner was shipped in. They aid in tucking the liner into the corners. The liner will look small during this step. It stretches considerably after water is added.

Notice how the liner spans over the walk out steps opening. This is left this way until you have 8" of water in the shallow end, then screw on the flange and cut the liner out of the step well.

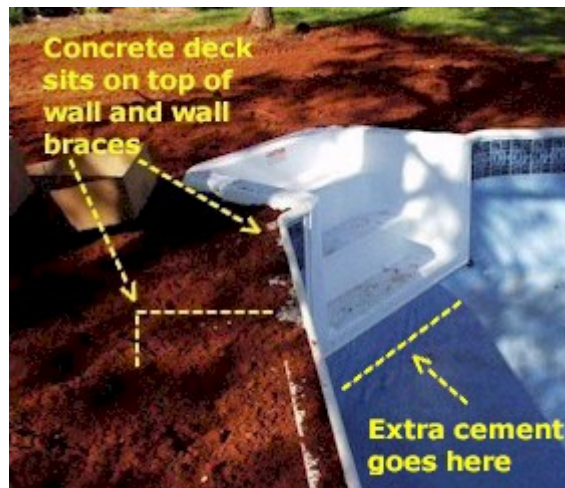


Open up a small section of the liner at the top and insert shop vacuum as shown. Vacuum hose should reach to bottom of pool. Duck tape closed the liner/hose opening. Turn on vacuum and it will pull the liner tighter to the sides of the pool. Smooth out any wrinkles. Vacuum should run until there is 8" of water in the shallow end.

Start filling pool. When there is 2" of water in the deep end, smooth any wrinkles, screw on bottom drain collar, and cut out liner from center of drain box. Place top on drain.

Notice in picture at right that your concrete deck will sit on top of the wall and be supported 18" out by the top of the wall braces.

Also notice the location of the extra cement placed under the liner at the bottom of the step unit during the bottom cementing step described on the previous page.



Swimming Pool Discussion

- Starting out correctly is very important...so do your homework. Determine the answers to the questions listed on page one of this article. Look for problems with your site such as drainage, or rock that may impact excavation.
- You can save about 50% by doing this job yourself over hiring it out to a swimming pool contractor. You can save about 150% over building a gunite/concrete pool.
- Contrary to popular opinion, when you sell your house, whether you have a vinyl liner pool or a concrete pool will make very little difference in the final outcome. Vinyl liner pools need a new liner every 8-10 years (at \$800-\$1600) and gunite pools need to be re-plastered every 10 years because the final coating of cement is etched away by the pool chemicals. (cost \$1200-\$1600). Besides, after you tell prospective home buyers your pool has a cement bottom and polymer sides under the liner, most concerns end there.
- A good rule of thumb is to put the top of the pool 6" above the highest point on your ground surrounding the pool.
- Find a good back hoe operator. You can try to hire the machine operator from swimming pool contractors and see if they will dig on nights or weekends privately for you. Another source of good machine operators will be septic system installers. You want someone who is on their machine daily. He will need a builders level/transit for determining that the excavation is level.
- Be ready for a mess. It does not matter whether you hire out the entire job, or do the entire job yourself, your back yard will look like a bomb went off in it!
- Plan on renting a skid loader (bobcat) for backfilling the pool walls and rough landscaping and grading in preparation for concrete pool deck.
- Plan on renting a 4 wheel drive tractor with grader box and stone rake for final landscaping and seed preparation.
- Polymer sided pools are excellent, and by far the most common. Do not believe just about any negative comment you read in competitive literature about polymer sides on in-ground pools.
- Galvanized steel sided pools are acceptable however future buyers of your home may question the longevity of steel, and it may raise questions...even though they are unwarranted. (With today's galvanizing processes...rust is not an issue)
- Fiberglass is hard to find and tends to be brittle.
- Aluminum is expensive, but probably the highest quality.
- Line up all your subcontractors ahead of time. If you use a standard concrete finisher in place of one for swimming pools, you will save between \$.75-\$1.00 per sq ft on the job.
- Fencing is an issue you will need to check with your local building code department about.
- For coping, buy the biggest and most expensive coping they offer for your pool. It holds the walls straighter, and the difference in cost is well worth it. Ask the supplier if they have a good, better and best selection in coping.
- The pool bottom will be a Portland cement and vermiculite mixture. This will harden to a softer surface than concrete, and is smoother and causes less wear on the vinyl liner.
- Add extra cement at the bottom of in the wall steps as described in the article.

- Select Pump/Filter location based on proximity to pool and source of electricity. Your pump/filter should not be excessively far from pool just to be close to electricity source. Pump and filter should be 30' or less from pool.
- Pool kits, filters and liners are available on the internet at discounted prices. Here is one source...see if you can beat the offering here! WaterWarehouse.com
- You can make the deep end of your pool 6' or 8' deep, because the liner is going to be made to your specifications, for your pool. A 6' deep pool allows diving but no diving board.

Critical measurements your vinyl liner manufacturer will need.

