

DRILLING SHALLOW WATER WELLS WITH THE BORZIT SYSTEM

WHAT YOU WILL NEED:

- DRILL PIPE should be $\frac{3}{4}$ " steel water pipe cut and threaded into 5' joints, or a 21' joint cut into 4 pieces.
- POWER FOR DRILLING is from a $\frac{1}{2}$ " or larger electric or gasoline drill, turning 300-500 RPM. With electric drills, we recommend a portable GFCI outlet to avoid any remote possibility of electric shock. These are available on our order form at a discounted price.
- DRILL PIPE HOLDER so you don't drop your casing or drill pipe down the hole.
- Use a LEVEL for the first 2 or 3 feet of the bore to ensure you are boring straight down.
- A WATER SOURCE will be needed to lubricate the BorZit Tool and soften the soil ahead of the drilling. If a rock no larger than 6"-8" in diameter is hit, the water will soften the soil so the rotation of the bit can "jiggle" it aside. If a water tap is not available, a tank of water is normally adequate. If using a portable generator for electricity, a sump pump gives enough pressure to keep the hole in the bit free of mud. Gravity flow can be used.
- 4" SCHEDULE 40 PVC CASING should be cut into 5" joints. Purchase or make a joint of perforated casing to allow water to enter the casing. If the water is found in gravel and coarse sand, you can perforate the bottom joint with a drill, or alternating cuts with a power saw. If the water is in fine sand, we recommend that you purchase a well screen designed to keep the fine sand out of the well.
- DRILLING SETUP for easier drilling includes a wooden pallet with a sheet of plywood or sheathing on top. Cut a 6" hole in the center to bore through. The pallet keeps you out of any mud or water
- PIPE WRENCHES, PVC CLEANER AND CEMENT, SAW TO CUT THE PVC, WELL DRILLING KIT (SEE SKETCH), & A PITLESS ADAPTER will be needed. Enough $\frac{1}{2}$ " brass screws to place 3 or 4 into both ends of each coupling. This ensures you can pull the casing out of the hole without the PVC cement pulling apart.

DRILLING TIPS:

- First, bore a pilot hole using a 2" or 3" bit. Drill down 1 or 2 feet into the water bearing structure. You can tell when you reach the aquifer, as the drilling will become easier and if gravel is present, it can be felt as the bit turns.
- At this point, pull out of the hole. If the pipe is difficult to pull, engage the drill (**ROTATING IN THE SAME CLOCKWISE DIRECTION**), and pull the drill pipe out while the bit is turning. After pulling out of the water bearing aquifer, the drill pipe and bit may pull out without the drill turning. If it is still tight in the hole, continue with the drill turning the drill pipe and bit as you pull.
- Attach the WELL DRILLING KIT PARTS to the drill pipe as shown in the sketch. Slide the perforated bottom joint of 4" pipe over the drill pipe and cement it into the 4" cap from the well drilling kit. Add the other 4" cap, with 1 1/8" hole in the center, to the top of the 4" pipe, but **DO NOT CEMENT IT TO THE PIPE**. This cap is to keep the drill pipe in the center of the 4" pipe. Add this cap to the top joint of 4" pipe until the drilling is done.
- Start drilling and push the 4" pipe down along with the reamer, adding joints of drill pipe and 4" PVC as you go. Normally you would use about the same amount of water as you did on the first bore.
- When the aquifer is reached, it may require more downward pressure on the 4" PVC, as the sides of the hole can be pushing in on the pipe because the sand and gravel displaced by the reamer will not stay back into the sides of the hole. We have been told that sometimes the sand and gravel will stay back and drilling can proceed as usual.
- If a PITLESS ADAPTER is to be used, put it into a joint of the PVC so the adapter will be below the frost line.
- After the drilling is as deep as you believe is needed, a test can be done to determine if adequate water is in the well. Run or pour water into the casing until it is full. If a gallon or two of water is pulled into the formation in 2 minutes, there should be a good supply of water in the well, and it should not be necessary to drill any deeper. Water running through the perforated pipe pulls the water in the casing out into the formation.
- Now is the time to "sacrifice the reamer" and pull the drill pipe out of the hole. Usually, reversing the drill is all that is needed to release the reamer, or you can remove it with a pipe wrench.
- Check the depth to the bottom of the well with a bolt on the end of a string. If the inside of the casing is much less depth than the amount of casing you installed, sand is in the pipe and will need to be cleaned out. This can be done in a number of ways. A sand bucket can be used. When the bucket is dropped into the well, the bottom opens and allows the sand to come in. When the bucket is pulled out, the bottom closes and the sand is lifted out. Another method is to surge the water and sand in the bottom of the hole. Joints of PVC pipe screwed together with a capped or plugged increasing coupling on the bottom end. Work it up and down for several minutes at the bottom of the well. This surging action will stir up the sand or silt and the water flowing through the perforated casing should clean it out. If water is available at the site, the well can be cleaned out by inserting a garden hose to the bottom of the well and turning on the water for several minutes. The water flowing through the casing should wash the sand out.
- If the well is for domestic use, you should pour a concrete slab around the pipe, at least 4 inches thick and sloping away from the casing to direct water away from the well. Have the water tested by a lab for bacteria content. The well can be disinfected by pouring two or three cups of laundry bleach in the well. Let it set for several hours and then pump the well until no chlorine smell is noticed.
- Follow the manufacturer's instructions for installing the pump.
- These are suggestions that have worked well, but you may have ideas that will be better in your situation.

Installing Well Points (Sand Points or Drive Points) Is EASY With the BorZit System

Many people have successfully used the BorZit System to install these points. Here are some tips to help you with the installation.

WHAT YOU WILL NEED:

- **DRILL PIPE** should be 3/4" steel water pipe, cut and threaded into 5' joints.
POWER FOR DRILLING is from a 1/2" or larger electric or gasoline drill. If using an electric drill we recommend using a portable GFCI outlet cord to avoid any remote possibility of electric shock. These are available on our order form.
- A **WELL POINT**, also called **SAND POINT OR DRIVE POINT**. These are available in various lengths and diameters of 1 1/4", 1 1/2" and 2". Different screen sizes are available depending on how fine the sand and gravel is in your area.
- Use A **DRILL PIPE HOLDER** so you don't accidentally drop your drill pipe down the hole. You can make one by drilling a 1 1/8" hole in the center of a piece of 2" x 4" or 2" x 6", then sawing the board in half lengthwise through the hole. Hinge it together at one end and put a screen door hook and eye on the other end to secure the two pieces together.
- Use a **LEVEL** to be sure you are boring straight down. Check this for the first two or three feet of the bore only, as you can't change the direction after that depth.
- A **WATER SOURCE** will be needed to lubricate the bit and soften the soil ahead of the drilling. If you hit a rock that is not over 6" to 8" in diameter, the rotation of the bit will usually jiggle it aside. Not much water is needed, so a tank of water and sump pump will be adequate if a water tap is not available. Gravity flow can be used, but be careful not to "jam" the bit into the bottom of the hole, as the hole in the end of the bit can become plugged with mud.
- **PVC OR STEEL PIPE** of the correct size for your well point or pump. Our 2" bit will bore a hole for pipe up to 1 1/4" with couplings; the 3" bit will bore a hole for up to 2" pipe.
- **DRILLING SETUP** for easier boring includes a wooden pallet with a sheet of plywood on top. Cut a hole in the center to bore through. This keeps you out of any mud or water and makes it handy to add or take off drill pipe and casing.
- If using PVC pipe to attach to the Well Point, several people have placed 3 small round head brass screws about 5/16" long on each side of every coupling. This will make the joints more secure with less chance it will pull loose if you need to pull the Well Point out of the hole.

DRILLING TIPS:

- Spoils from the drilling are compressed into the sides of the hole by the rotation of the bit. You aren't flushing the cuttings out of the hole, so a large volume of water is not needed.
- For **WELL POINTS**, drill down to the water bearing sand or gravel and pull out of the hole. You can usually tell when you hit the water bearing structure as the drilling will become easier and if gravel is present you can feel the bit rotating in it. **DON'T ATTEMPT TO DRILL VERY FAR INTO WATER BEARING SAND AND GRAVEL**, as the water flowing through the formation will not usually allow the hole to remain open when you pull out. Attach the well point to the pipe that you want to leave in the hole. When you reach the water bearing sand and gravel you can push or pound the well point down to the depth needed. This is relatively easy once you get into the water bearing structure. The BorZit System lets you avoid the drudgery of pounding the well point through the soil above the water. After installation, you can test for the amount of water in the well by filling the pipe with water. After two minutes, if a gallon or more water is needed to fill the pipe back to the top, an adequate volume of water is probably in the hole, and there is no need to go deeper. The water in the water bearing formation is going through the holes in the well point and taking the water in the pipe out into the aquifer.
- If a larger volume of water is desired, multiple Well Points can be connected together to produce more gallons per minute. The Well Points should be placed 12-15 feet apart so the "draw-down" for each Well Point will not affect the flow of water from the others.