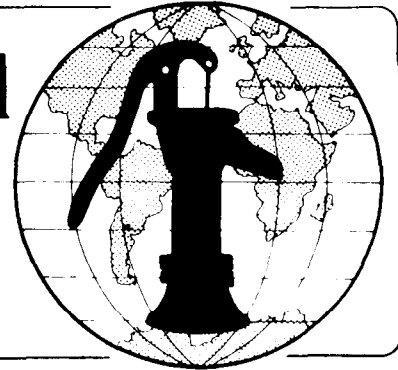


Water for the World



Designing Driven Wells Technical Note No. RWS. 2.D.2

It is important to design driven wells properly to ensure a year-round supply of water and to ensure efficient use of personnel and materials. Designing involves selecting the type of well point; choosing a method of driving; and determining the necessary personnel, materials, tools, and equipment. The products of the design process are: (1) design drawings of the well point and driving equipment and (2) a detailed materials list. These products, along with the location map from "Selecting a Well Site," RWS.2.P.3, should be given to the construction foreman before construction begins.

This technical note describes how to design a driven well and arrive at these end-products. Read the entire technical note before beginning the design process.

Selecting a Well Point

There are a number of types of well points that can be purchased or manufactured. Basically, they can be divided into two categories: screen and slotted. Figure 1a shows a screen-type well point. It consists of an open or perforated frame covered with one or more screens. This type is relatively less expensive than the slotted well points. However, it is less resistant to damage during driving and over-pumping of ground water may plug the screen. Figure 1b shows the slotted-type well point. It is more expensive, but it is sturdier and less likely to become plugged during over-pumping.

When you have determined which type of well point is best for your situation, prepare a design drawing similar to Figure 1a or 1b and give it to the construction foreman.

Useful Definitions

AQUIFER - A water-saturated geologic zone that will yield water to springs and wells.

GROUND WATER - Water stored below the ground's surface.

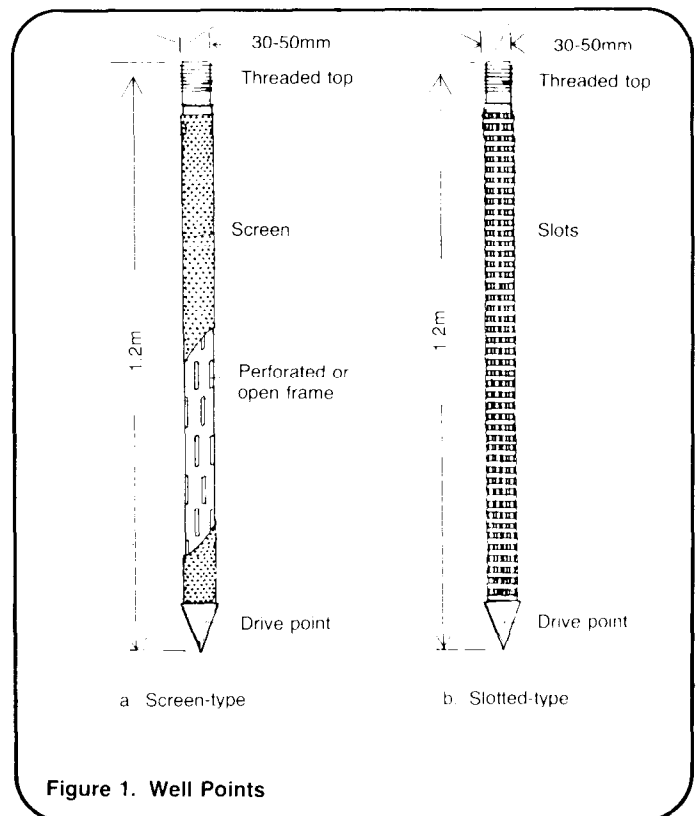


Figure 1. Well Points

Determining the Method of Driving

The four basic methods used to drive a well are a sledgehammer, a weighted driver with handles, a driving bar, and a driving weight.

Sledgehammer. This is the simplest and least expensive method. One man strikes the drive cap with a sledgehammer, driving the pipe and well point through the ground and into the aquifer. The depth of the well cannot be very great because of the limited driving force. See Figure 2.

Weighted Driver. This is an inexpensive device consisting of a length of pipe, larger in diameter than the well pipe, with a weight on top and two handles welded to the sides. See Figure 2. The driver is slipped over the well pipe and drive cap. Two men raise the driver and either throw it down or let it drop onto the drive cap, driving the pipe and well point into the ground. This method can be used to reach somewhat greater depths than the sledgehammer method.

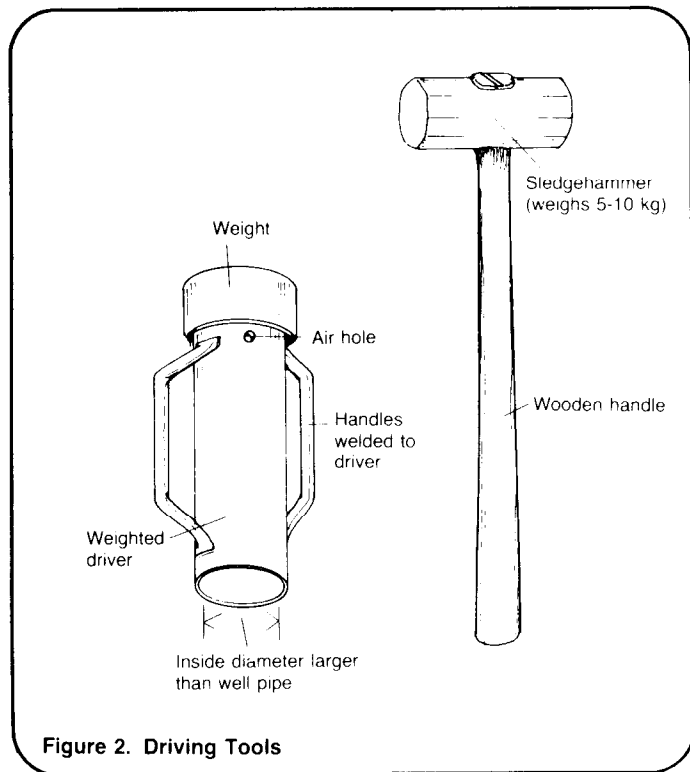
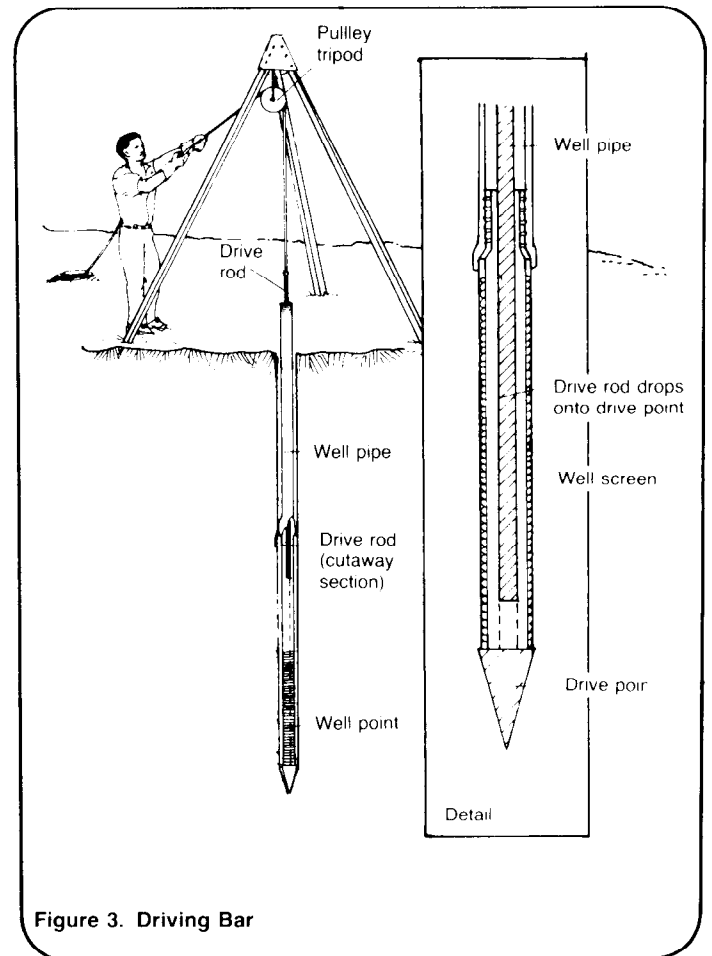


Figure 3. Driving Bar

point, driving the well point and pipe into the ground. This method is more expensive than the sledgehammer and weighted driver methods, but it can sink a well to greater depths.

Driving Weight. This method also requires a tripod with pulley and rope to be erected over the site. A heavy weight is raised with the rope and allowed to fall on the drive cap. The falling weight is directed by a guide rod, which either is attached to the weight and slides into the well pipe, or is attached to the well pipe and slides through the weight, as shown in Figure 4. This method can achieve the greatest depths possible for a driven well.

When you have determined which method of driving the well is best for your situation, prepare a design drawing similar to Figure 2, 3, or 4 and give it to the construction foreman.

Driving Bar. In this method, a tripod with a pulley and rope is erected over the site. A heavy drive bar, smaller in diameter than the well pipe, is suspended from the rope and allowed to drop inside the well pipe. See Figure 3. The bar strikes the drive

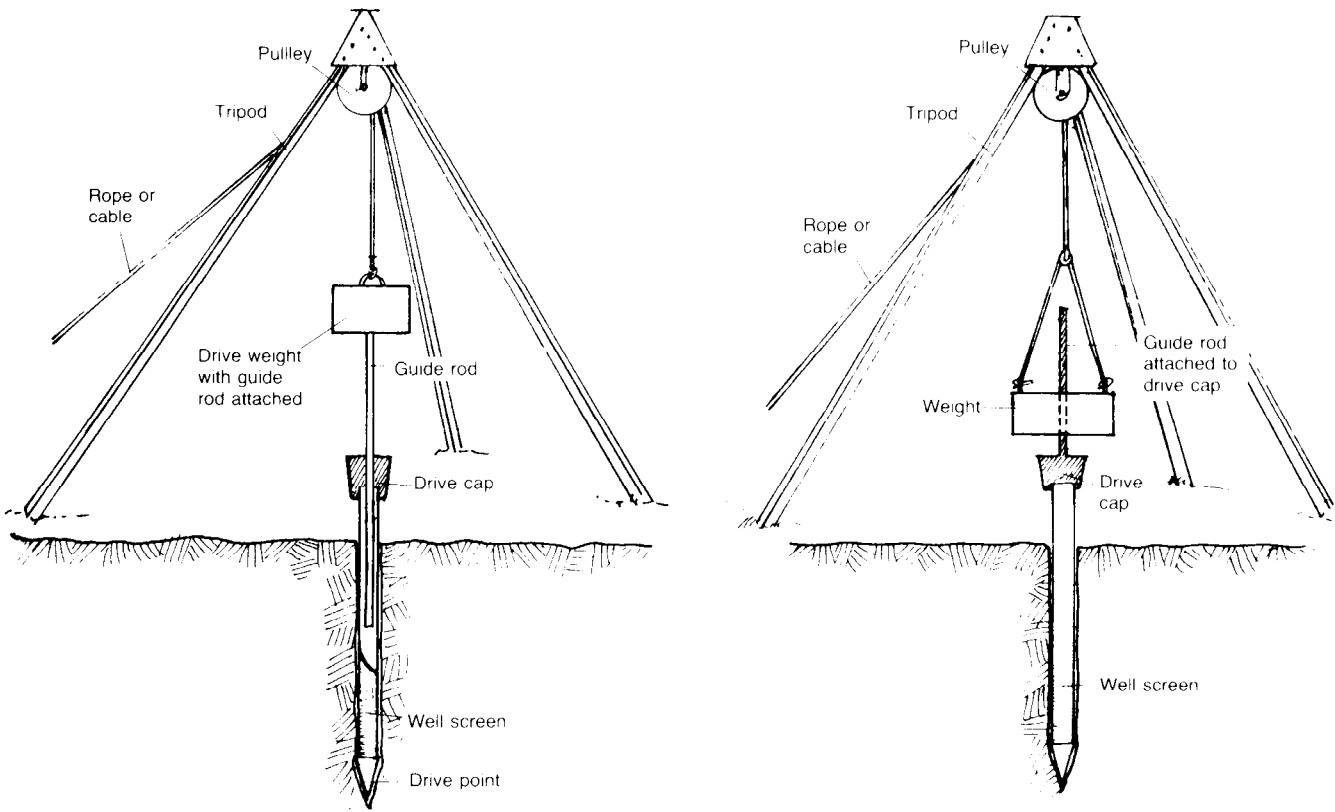


Figure 4. Driving Weights

Determining Personnel, Materials, Tools, and Equipment

The number of workers needed to drive the well depends on the method of driving: one or two for sledgehammer; two for weighted driver; two or three for both driving bar and driving weight. Also, there should be one worker to check the plumb line and to give the pipe a quarter-turn with a pipe wrench after each blow. If the driving equipment is to be fabricated, one worker should have skills as a blacksmith or welder.

The required driving equipment depends on the method of driving the well (see "Determining the Method of Driving"). All driven wells require a well point, sections of well pipe, couplings, and a drive cap (except the driving bar method). Tools needed include a pipe cutter, pipe wrench, file, pipe threader, hammer, crowbar, assorted wrenches and screwdrivers, and a shovel or auger.

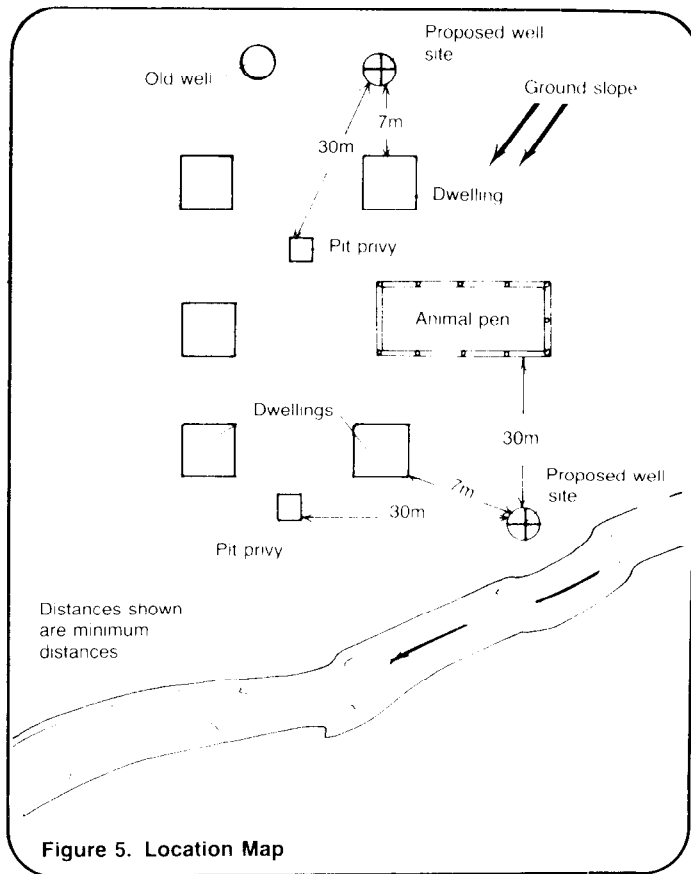
When you have determined all necessary personnel, materials, tools, and equipment, prepare a materials list similar to Table 1 and give it to the construction foreman.

Table 1. Sample Materials List for a Driven Well

Item	Description	Quantity	Estimated Cost
Personnel	1 worker A helper, if needed for construction A helper, if needed	1 1 1	
Equipment	Well point Pipe sections (some of section) Couplings Drive cap Drive cap		
Tools and Equipment	Measuring tape File, cut and file Crowbar Tripple pulley rope assembly Pipe wrench with adjustable side Pipe cutter Pipe wrench Miscellaneous Pipe threader Hammer Crowbar Wrenches, assorted sizes Screwdrivers, assorted sizes		

Table 1 continued on next page

In summary, give the construction foreman a location map similar to Figure 5, described in "Selecting a Well Site," RWS.2.P.3, design drawings of the well point similar to Figure 1 and driving equipment similar to Figure 2, 3 or 4, and a detailed materials list similar to Table 1.



Technical Notes are part of a set of "Water for the World" materials produced under contract to the U.S. Agency for International Development by National Demonstration Water Project, Institute for Rural Water, and National Environmental Health Association. Artwork was done by Redwing Art Service. Technical Notes are intended to provide assistance to a broad range of people with field responsibility for village water supply and sanitation projects in the developing nations. For more detail on the purpose, organization and suggestions for use of Technical Notes, see the introductory Note in the series, titled "Using Water for the World: Technical Notes." Other parts of the "Water for the World" series include a comprehensive Program Manual and several Policy Perspectives. Further information on these materials may be obtained from the Development Information Center, Agency for International Development, Washington, D.C., 20523, U.S.A.