

How To Construct a Spring Box



Be Advised

Using the following presentation assumes that individuals have a basic knowledge of construction. The user should be able to adjust measurements and quantities depending on their specific site requirements. The exact measurements will depend on the site specific design criteria, but at a minimum, the spring box should have three PVC pipes exiting the box (one for the main line, one for future expansion, and one overflow) and an access door. Cement should be mixed to local specifications depending on the type of materials available.



Materials

- 1 tube (6m) PVC pipe
 - The size of pipe will be a function of the flow from the spring
- 3 or 4 PVC elbows of size equal to tube
- 2 lbs of tie wire
- 100kg of 3/8" reinforcing rods (rebar)
- Twenty (20) x 50kg bags cement
- 2 cubic meter sand
- 2 cubic meters gravel
- 5 cubic meters large stone (15+ cm diameter)
- 1 lb of 2-1/2" nail
- 1 lb of 4" nails
- Three (3) wood boards 10" x 3/4" x 12'
- Six (6) wood boards 2" x 4" x 6'
- One (1) wood post 3" x 3" x 6'
- One (1) 2" bronze lock for access door



Getting Started

- Once the spring has been identified, determine a convenient location to build the spring box wall. In this case where the banks of the pool narrowed into a stream.
- Clear away as much of the rocks and foliage as possible, both within the spring pool and the surrounding banks.



Getting Started

- It is important to have several areas flattened for work
- A flat area, approximately 2.5m, in diameter will be needed for mixing concrete
- Space should be cleared to store sand and gravel
- The area where the spring comes to the surface should be dug out, flattened, and all large stones (greater than 10cm diameter) should be removed



Site Preparation

Remove all stones and level the area
Where the spring surfaces

Flatten an area for mixing of concrete



Getting Started

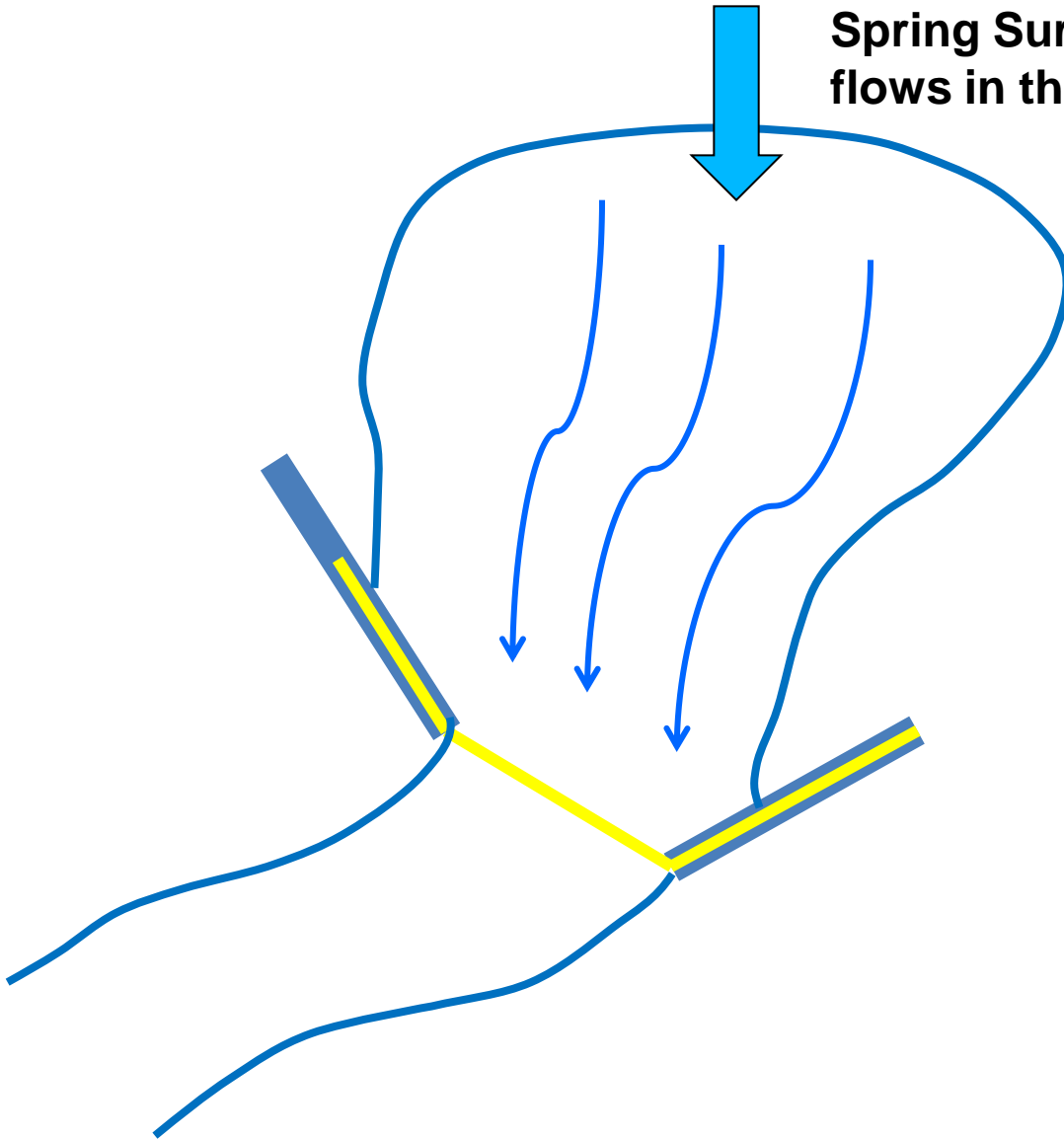
Once the spring has been cleared of debris, begin to fill it with rocks, starting from the spring source

Spring Source



Preparing the Spring

Spring Surfaces, water
flows in this direction



Preparing the Spring



Spring Surfaces, water flows
in this direction

First remove all
large stones and
other obstructions
from this area, then
refill with 15-50cm
diameter stone

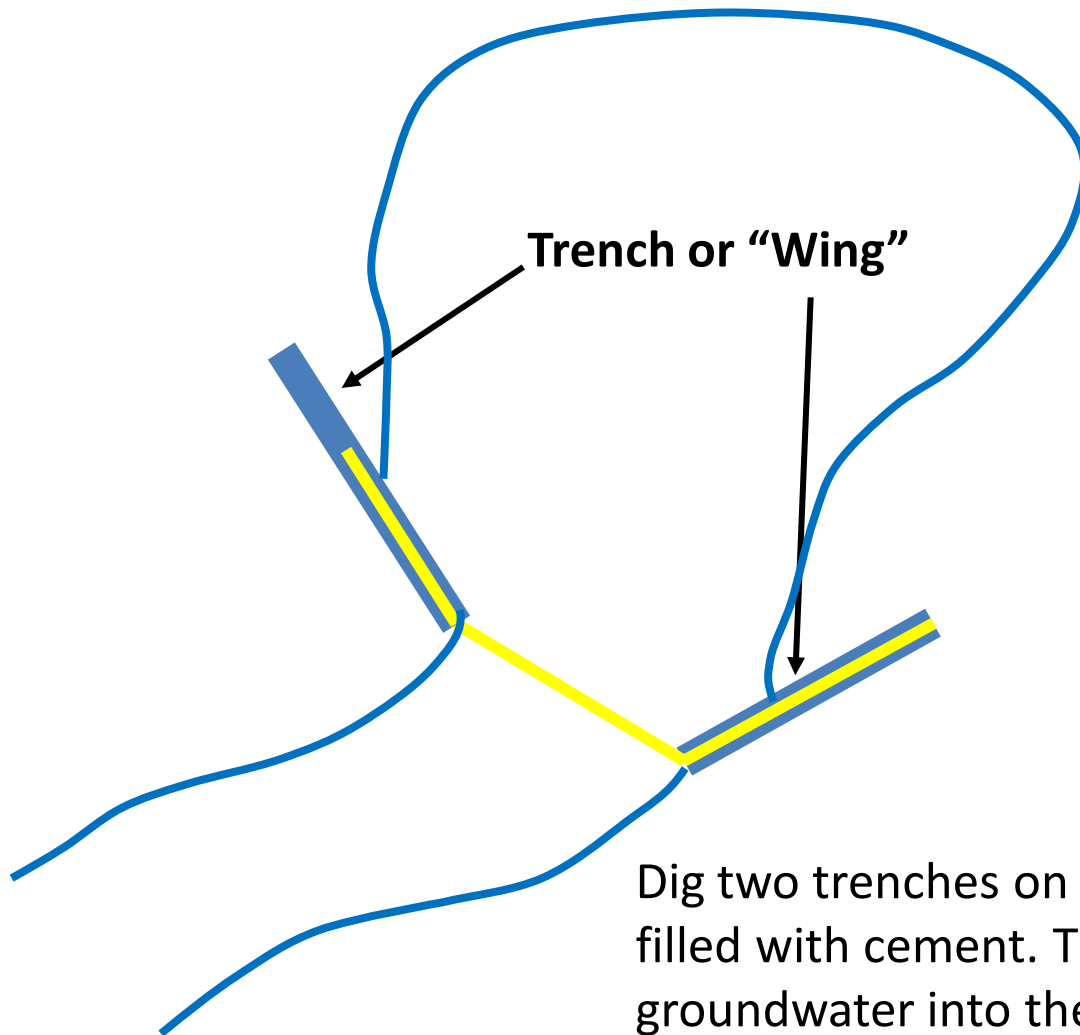
An area should be left clear in this
location approximately 1m x 1m x
0.7m depth. This space will be used
to construct a box where water will
collect before exiting the box.

Preparing the Spring

Continue to fill the spring with large stone (15cm-50cm diameter) until the area is filled and matches the contours of the surrounding land



The “Wings”



Dig two trenches on either side of the spring to be filled with cement. The “wings” will serve to capture groundwater into the spring box

Try to maintain a 40cm to 50cm width for the trench. It is okay if the trench becomes wider. Sometimes it is necessary to widen the trench to remove large stones.

Trenches dug to either side of the spring



“Wing” or trench



**Next slide
shown
looking
into trench**

**“Wing” or
trench**

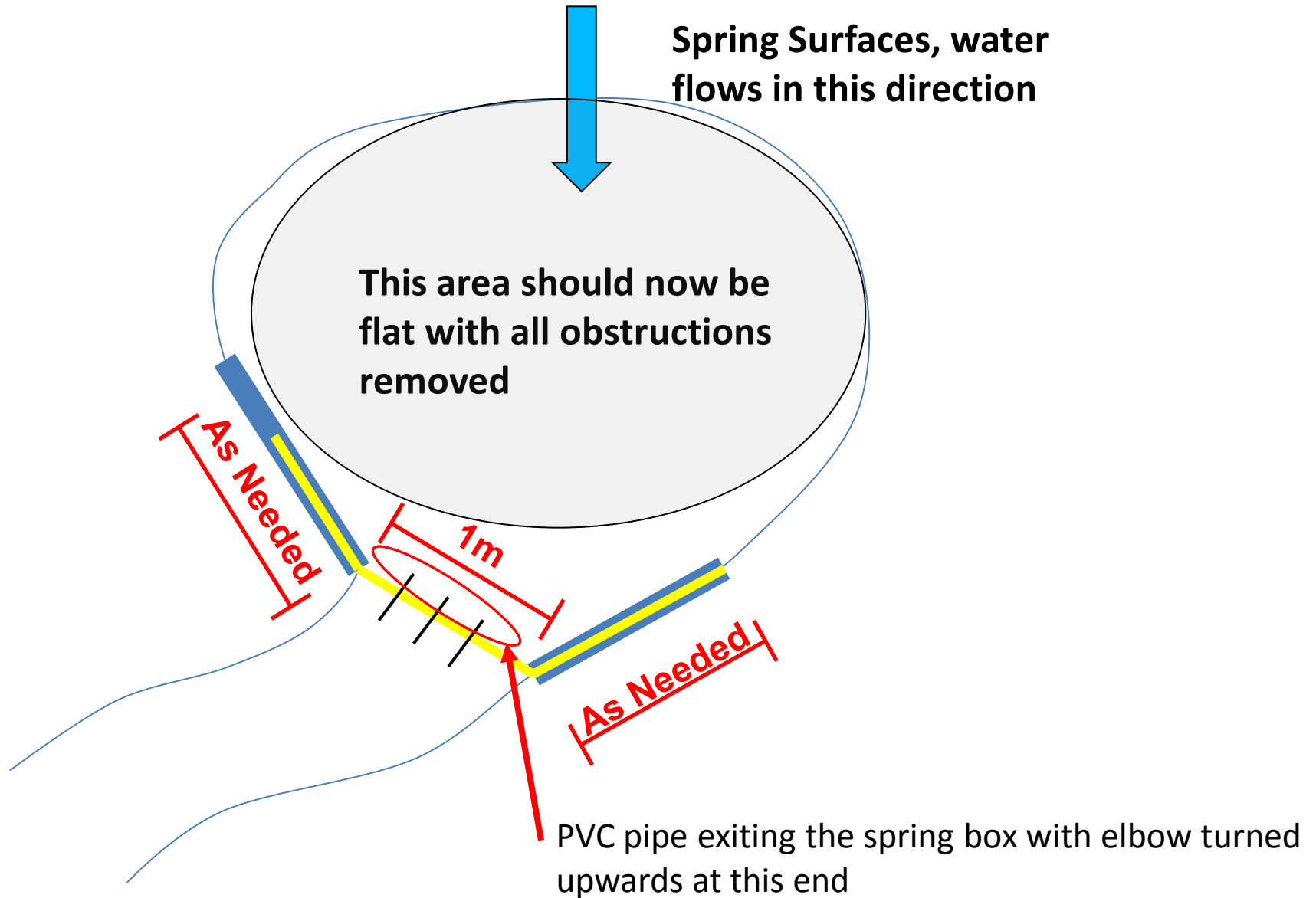


If possible, continue digging away from the spring until water is no longer seeping in from the end of the trench here

Water should not be seeping in from this wall

Spring source

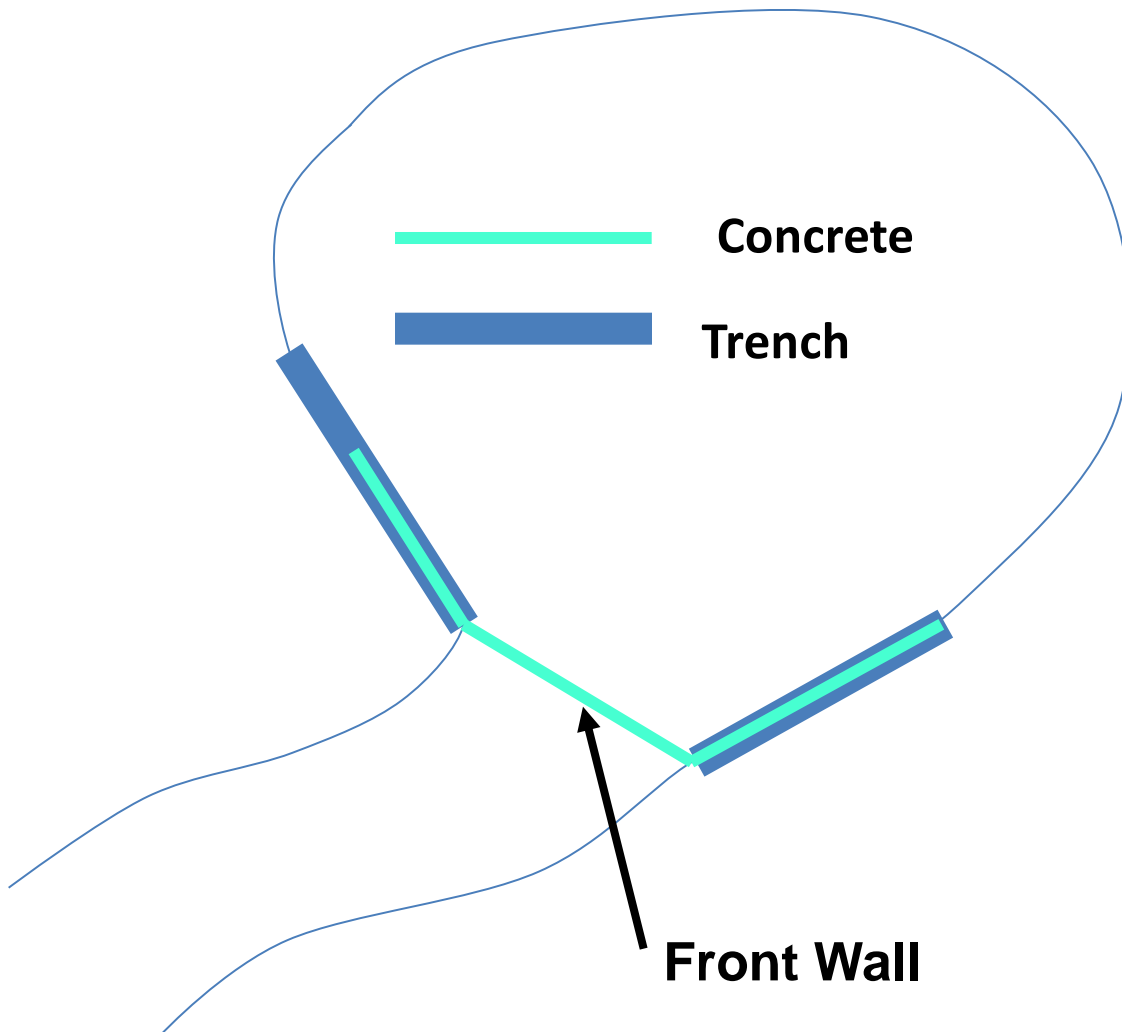
Layout



Constructing the spring box wall



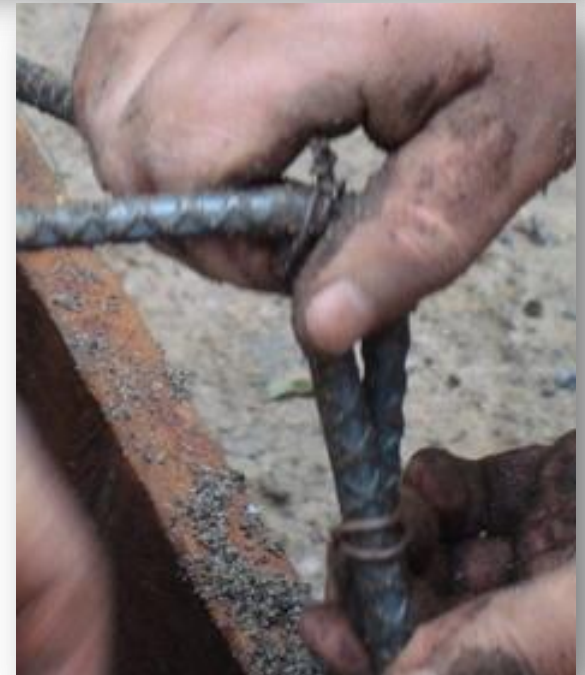
Spring Box Wall Locations



- Build a mold that will fit inside the trench and across the front wall of the spring box
- The form should provide a wall thickness of at least 10cm
- A rebar frame should be built that will fit inside the form
- It will be placed in the center of the mold, allowing 5cm clear cover between the form walls on all sides

How to Tie Rebar

- Attach the rods using small pieces of metal wire, ensuring that once tied, there are no sharp tails left.
- For rods that are parallel to each other, a simple wrap round and twist with a pair of pliers, will be sufficient



How to Tie Rebar

- For rods that are perpendicular to each other use an “iron workers knot” illustrated in the pictures opposite.

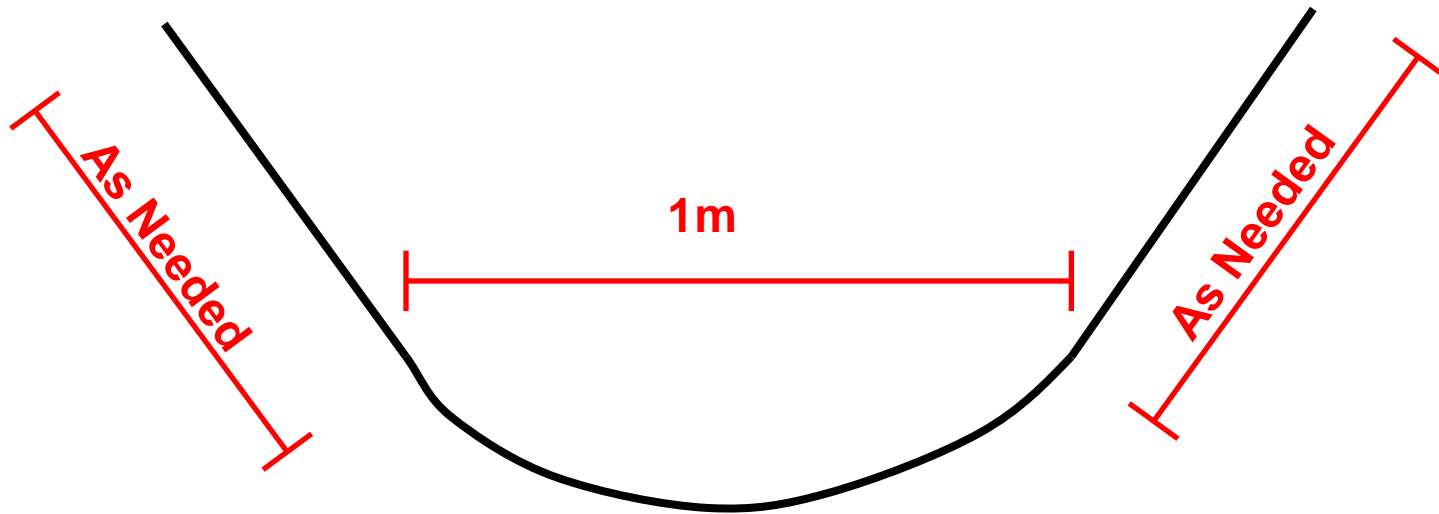


- Construct a wooden form for the spring box wall. It should be large enough to span the three sides of the spring box. The form for the front wall should have holes cut in the center at the bottom of the form to allow PVC Pipe (minimum 3 tubes) to fit through
- Construct the rebar frame to fit inside the form
- Leave holes in the bottom of the frame for PVC Pipe (minimum 3 tubes)



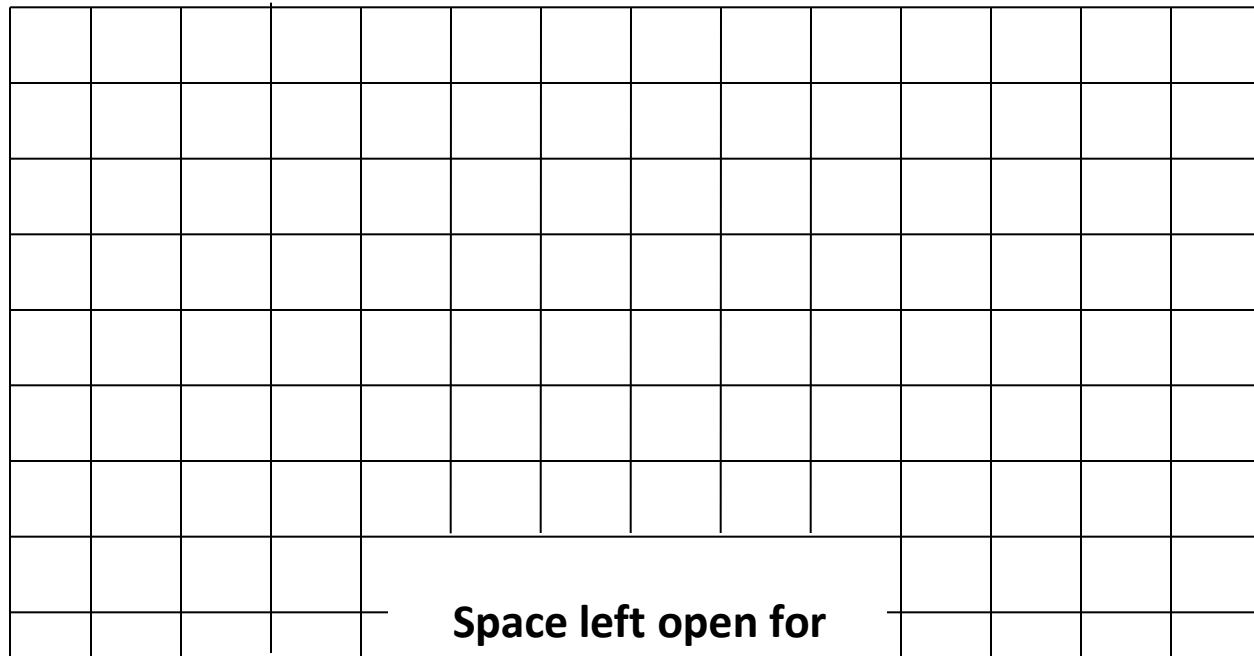
Rebar Wall Frame (Plan)

- The rebar frame should be built to fit inside the wooden form, matching the contour of the trenches
- 5cm clear cover should be maintained between rebar and wooden mold for concrete



Rebar Wall Frame (Elevation)

Maintain 10cm spacing, number of bars will vary



Space left open for
PVC tubing

Maintain 10cm spacing, number of
bars will vary



Rebar Wall Frame

Trench

Area dug out,
stones removed,
then refilled with
stone (15-50cm
diameter)



Hole in place for
tubing

trench

Rebar Wall Frame

- Place the form walls across the stream
- Insert the rebar frame within the form walls, ensuring that the holes through which the tubes will fit, are aligned



Pipe Instalation

- Insert at least three tubes through the holes.
- The tubing will have a 90° elbow attached to the end contained within the spring box.



Pipe Instalation

- One tube will be used as an overflow. Be sure this pipe sits with the top of the elbow (where water will enter) at least 10cm above the other tubes. You may need to place sand or pebbles under them to ensure this is the case.
- Block gaps left between the tubes and the hole cut into the mold walls. In this case, empty cement bags were used.



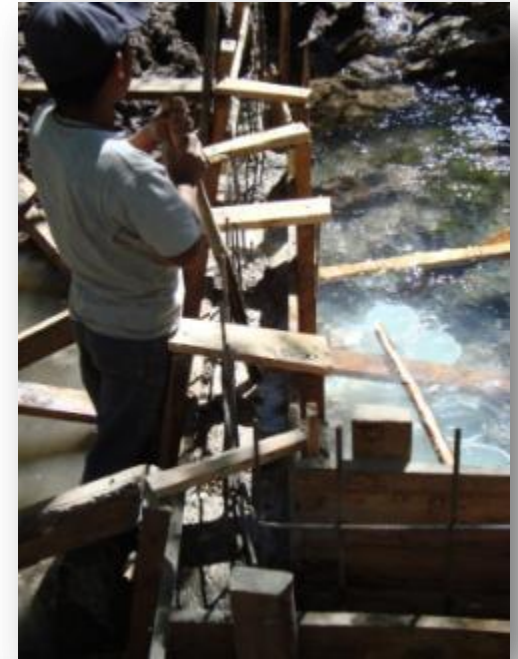
Wooden Supports

- Ensure that the mould walls are supported so they do not collapse under the weight of the cement
- Remaining wood boards can be used and stones are make good supports



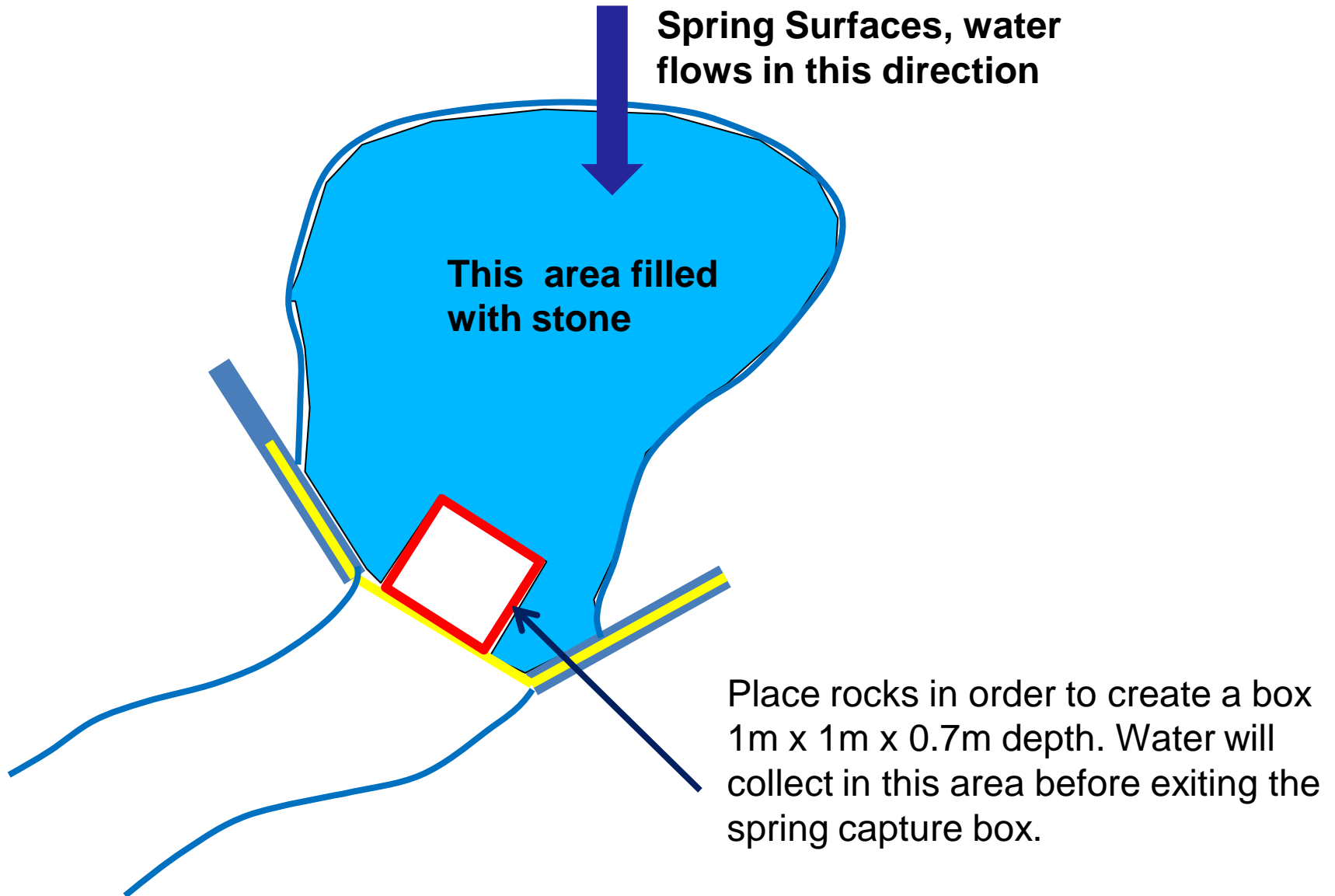
Cement Mixture

- Pour dry cement into the bottom of the form to absorb standing water
- Now, add wet cement until the mould is full
- The mix should be 3 parts gravel to 1 part sand to one part cement by volume





Preparing the Spring



Rocks Placement

- Continue to add rocks to create a box
- The dimensions should be approximately L 1m x W 1m x D 70cm



Wooden Frame

- Build the roof over the pool to the same level as the surrounding rocks
- Be sure to score the wood in the area of the access door
- You must be able to break out the wood in this area with a hammer
- See following slides for more information



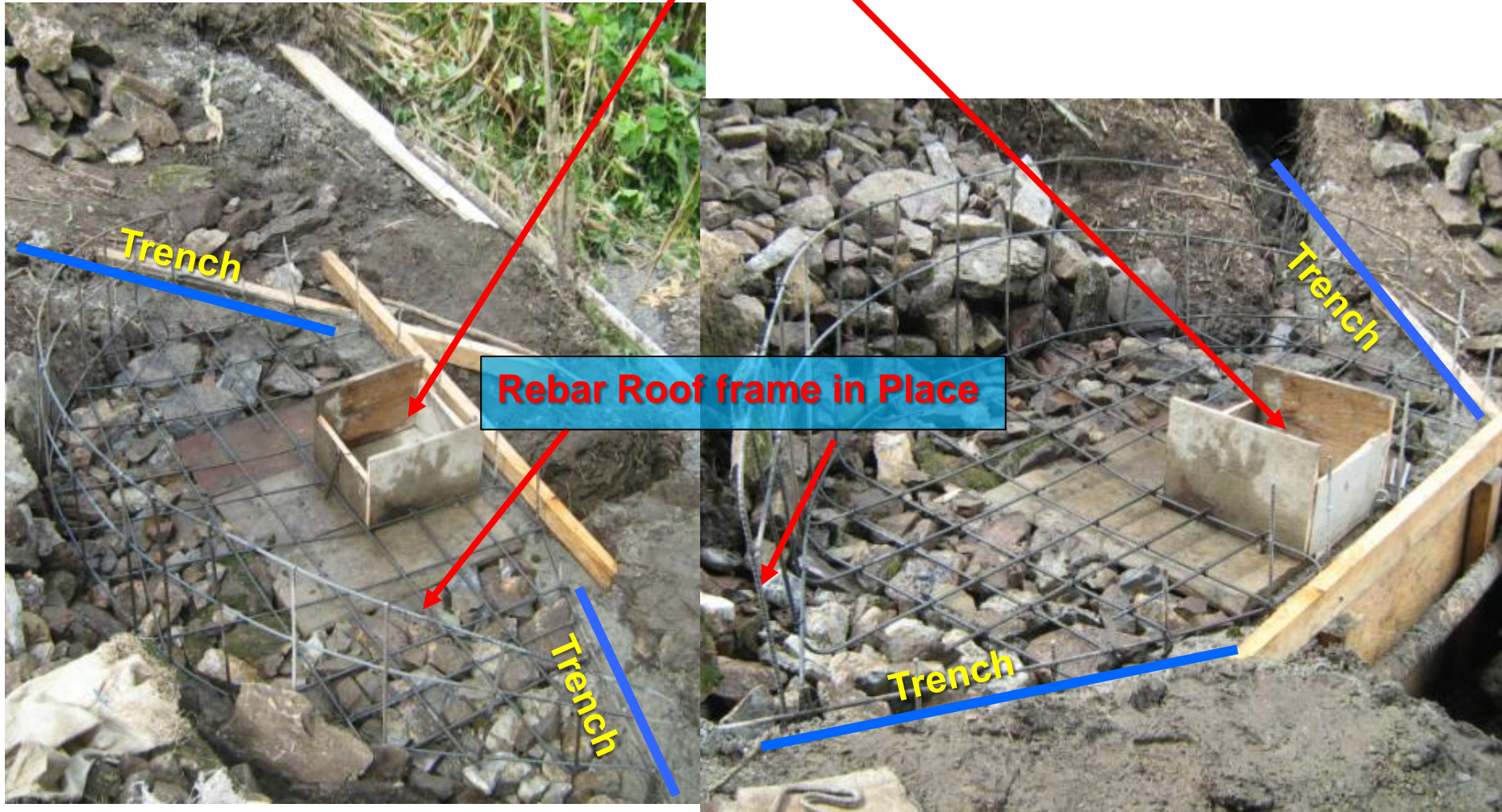
Wooden Frame

- Place a box with the dimensions of 30cm x 30cm x 30cm over the roof of the tank, above the tubing, to provide space to insert the access door
- The wood in the area under the form should be precut along the edges of the access door
- The roof will be covered with concrete except in this area.
- The precut sections of wood can be knocked out with a hammer after concrete has sufficiently cured
- The door will lift off from this spot, and you must be able to enter the spring box from this spot.



Rebar Roof Frame

Access Door Form in Place



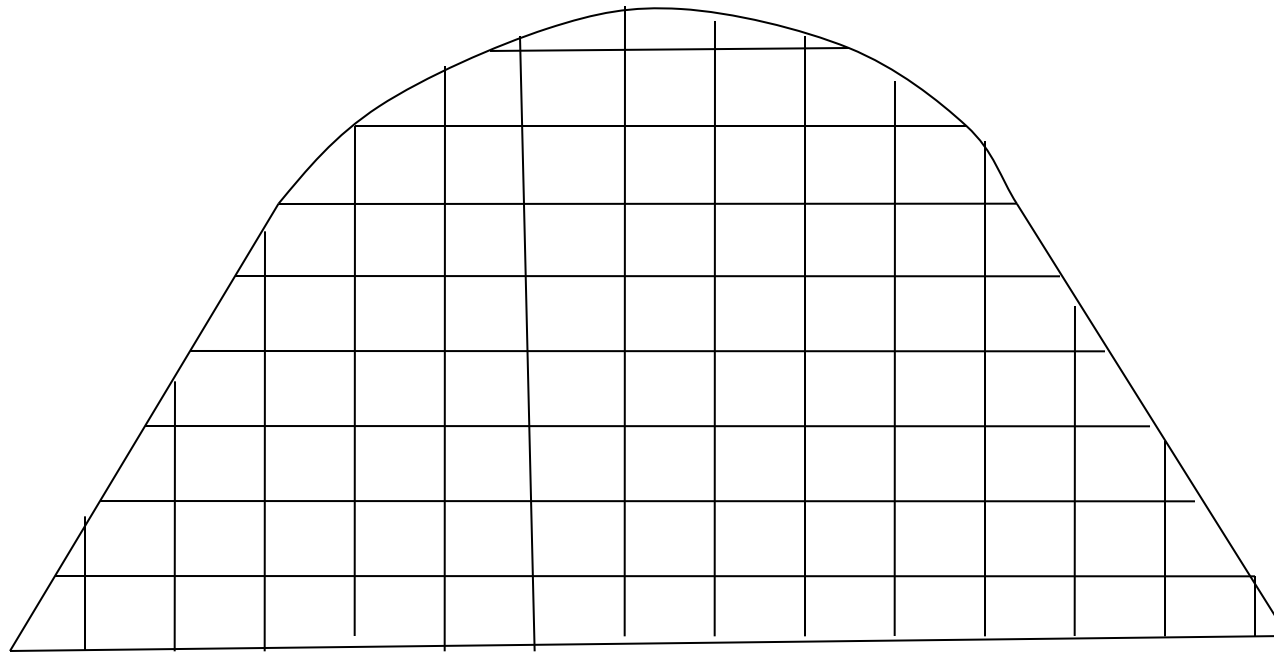
Rebar Roof Frame (Front View)

Access Door Form in Place



Rebar Roof Frame (Plan)

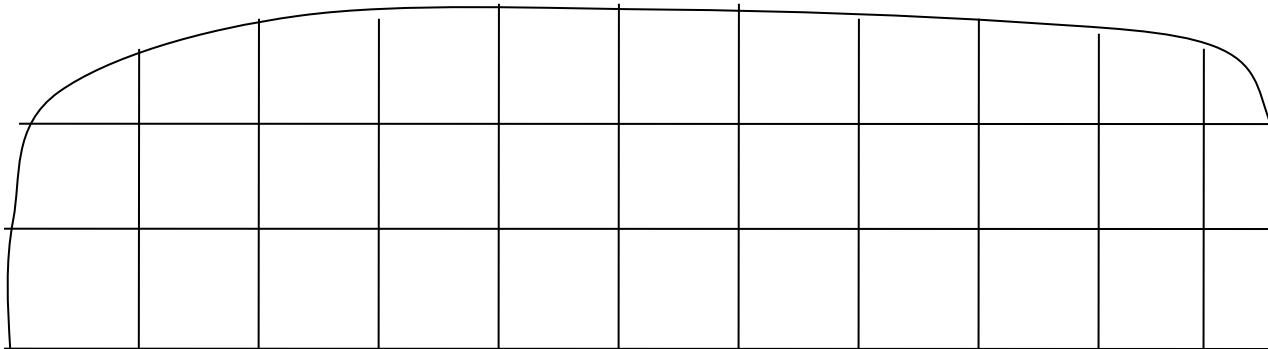
Maintain 10cm spacing, number of bars will vary



Maintain 10cm spacing,
number of bars will vary

Rebar Roof Frame (Elevation)

Maintain 10cm to 20cm spacing, number of bars will vary



Maintain 20cm spacing,
number of bars will vary



Rebar Roof Frame

- Reinforce the roof with rebar
- Tie bars together with wire to form a grid.
- The grid will extend out over the surrounding rocks, but need not cover the whole area



Rebar Frame

- Attach iron rods over the roof of the tank, forming a semi circle surrounding the trap door.
- This semi-circle will form a wall to prevent contaminated run-off entering through the trapdoor.
- Flatten any rods from the metal frame that are protruding from the wall mould



Rebar Frame

- Fill any gaps between the wooden roof supports and the rock bed.
- Cover the roof support and rock bed with water, to allow the cement greater adhesiveness



Cement Mixture

- Cover the entire roof of the tank and rock bed with cement.
- Use wooden planks to surround the tank to ensure a neat finish.
- Some concrete should be added around the perimeter of the future access door to create a ridge
- The access door will fit over this raised section



Cement Mixture

- Attach rebar horizontally across the rods shaped as a semi-circle.
- Cut wood and attach them to the semi circle to form a mold
- Leave a gap of 10cm between forms to fill with concrete



Cement Mixture

- Once the cement has dried, the moulds can be taken off the tank.
- The front of the tank will need a layer of grout to leave a finished surface.
- A mix of 2 parts sand to 1 part cement will be used.



The Access Door

- A form should be placed over the box where water collects before exiting the spring capture box
- The access door will allow for periodic cleaning and maintenance of the spring capture box.
- The following slides show how to construct a lid for the box.



The Access Door

- Rebar should be equally spaced at 10cm apart
- The wood form should have inside dimensions of 35cm x 35cm x 10cm
- Maintain 5cm clear cover between form and rebar





- To make the access door to the spring box first create a 30cm x 30cm form.
- Add rebar as shown, maintaining 5cm clear cover around the perimeter
- Pour concrete to top of form (10cm)
- A handle, made of rebar, may be added at the center by tying a rectangular section of rebar to the center square of bar created





A lock is placed on the access door to prevent unintended entry and accidents

**The Spring Box is now
completed and ready for use!**

