

Reservoir

1. Main Dimension

- Foundation diameter 220 cm
- Outside Reservoir Diameter 1.72 m
- Inside reservoir diameter 1.42m
- Rebar Ring diameter 1.60 m → circumference = 5 m

Nb of molds	1	2	3
Inside Height (m)	80	180	280
Outside Height (m)	100	200	300
Usable volume (m³)	1.2	2.8	4.4
Cement (quintal)	6	8	10.5
Rebar 8 mm (12m bar)	6	6	6
Rebar 6 mm (kg)	20	40	60

2. Construction Schedule:

The mason must wait 7 days before removing the inside steel mold and wait another 7 days to remove the top slab formwork (planks). Good planning is needed so that the mason:

- 1) Start with the reservoir slab & walls (5 working days)
- 2) Start the WP Slab while waiting for the wall curing (5 working days)
- 3) Build the top slab (2 working days)
- 4) Finish the WP while waiting for the top slab curing (5 working days)
- 5) Remove the reservoir formwork (1 day)

Total 1 month work

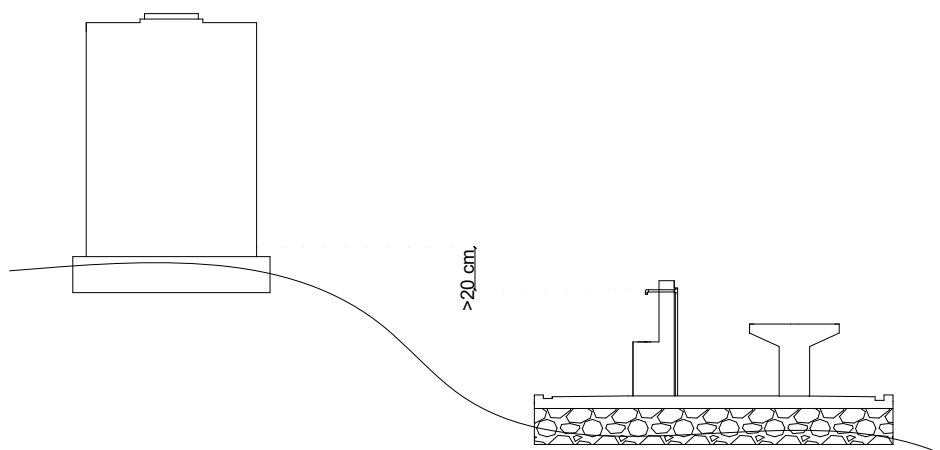
3. Main remarque & step to supervise closely

This reservoir design uses as little material as possible; this means that there is not a huge safety margin: **the execution must flawless**. Pay special attention to the following points:

- 1) This reservoir needs perfect cure, the **pipeline with running water** must reach the site **before** construction start.
- 2) Inside form must be oiled with **cooking oil** as it will be in contact with potable water
- 3) The reservoir resistance to water pressure is mainly due to the rebar rings: take special care in **the tying of the rebar** and **in opposing the horizontal iron ring connections**
- 4) The connection between bottom slab and wall is prone to leakage : create **indentation in the slab** and **clean thoroughly** before casting
- 5) **Fill completely** the reservoir the day after casting and let **it cure underwater for 7 days minimum**

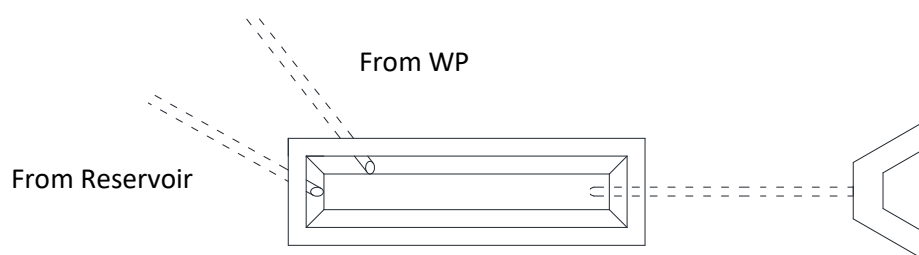
4. Reservoir position

The reservoir is built for one WP only, as close as possible to it: The elevation between the faucet of the water point and the slab of the reservoir should be above 20 cm.



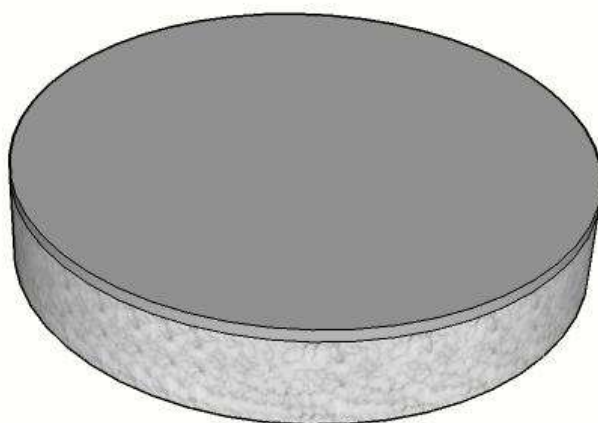
Connect the **overflow of the reservoir (50 mm)** to the cattle through if the distance is less than 50 m.

It is better to place the 2 evacuations (reservoir overflow & WP evacuation) separately into the cattle though wall rather than to use a Y.



5. Foundation

Diameter 220 cm, 30 cm hard core stone, 5 cm lean concrete

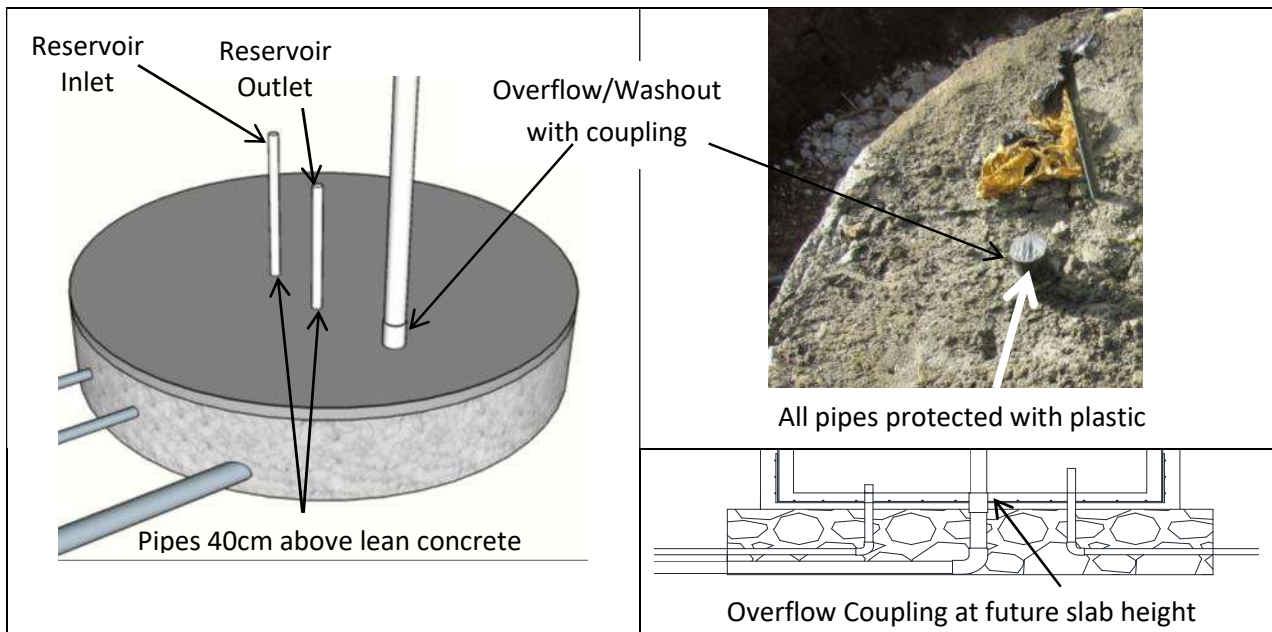


Reservoir without DB:

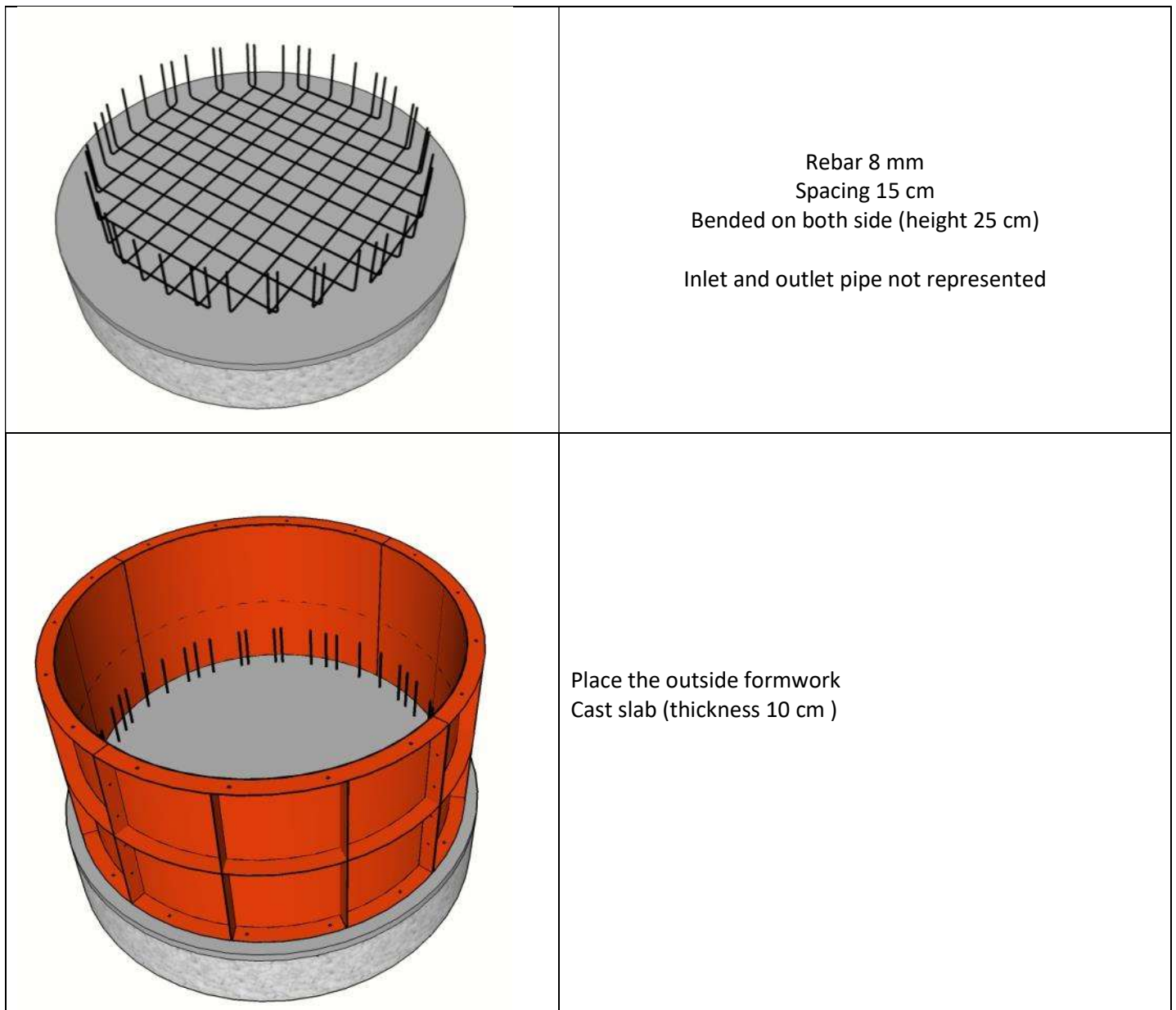
Inlets & outlets pipe on elbows (40 cm above lean concrete)

Inlet in PVC 25 mm , outlet in PVC 32 mm

Overflow / Washout 50 mm with coupling & elbow (toward cattle through)



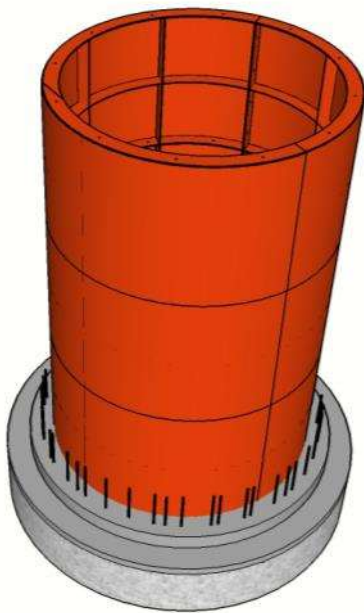
6. Slab





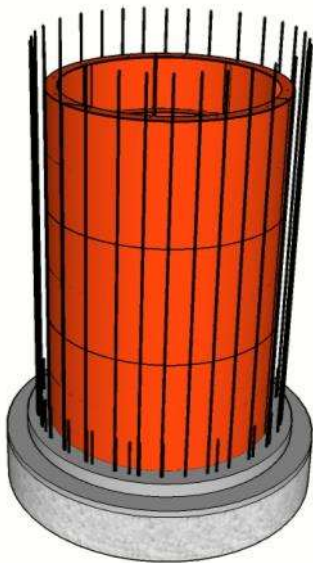
On the outer 15 cm of the slab make some deep cross with the trowel to improve the future wall / slab connection

7. Wall reinforcement

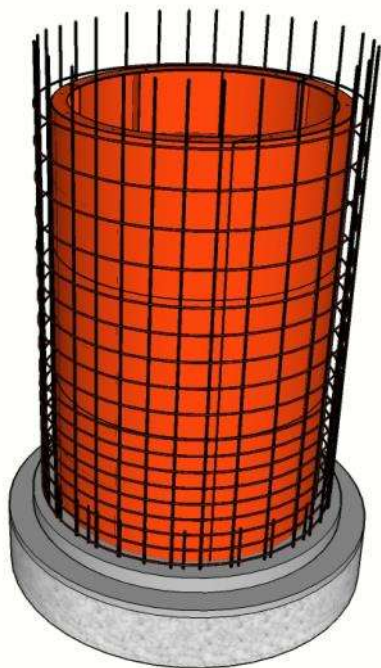


Remove outside form
Place inside form
Oil the inside form with **cooking oil**





Place vertical bar 6mm
 Spacing 15 cm
 Vertical bar must be attached to slab rebar
 Vertical bar height must be 25 cm over inside mold



Take special care not to place the ring
 ends on top of each other

Cut 6 mm horizontal bar : length = 5.25m
 Bend them to form a round (1.6 m diameter)
 Attach the two ends (25 cm overlap)
 Place them **outside** the vertical rebar

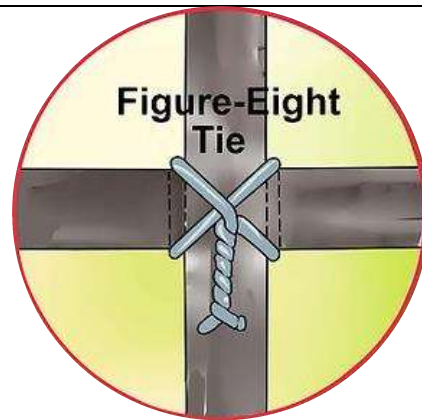


Horizontal circle spacing

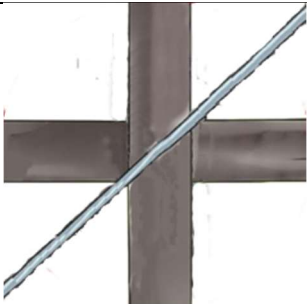
Nb of Mold	Reservoir 1 row	Reservoir 2 rows	Reservoir 3 rows
Bottom row	20 cm	15 cm	10 cm
Middle row		20 cm	15 cm
Top row			20 cm

Rebar attachment with bending wire:

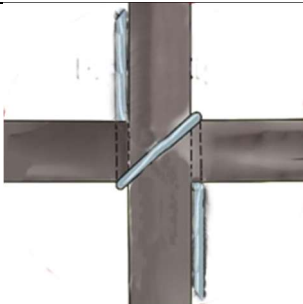
1. The rebar rings are the main elements that resist water pressure
2. The compaction must be quite powerful
 - The rebars must be attached very strongly using figure 8 tie



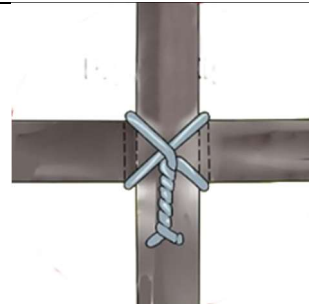
1. Place the wire diagonally over the front bar



2. Pass the wire behind the back bar



3. Tie the wire

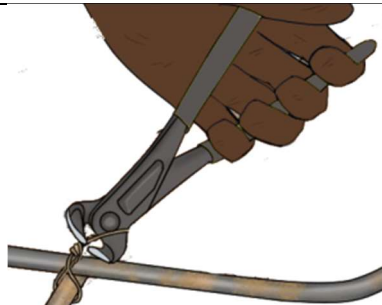


To tie the wire:

1. Turn the pliers to bend the wire



2. Rotate the pincer, against the main rebar to pull the wire with a lever effect



Repete step 1 and 2 until the two rebar are strongly fastened

8. Casting the wall

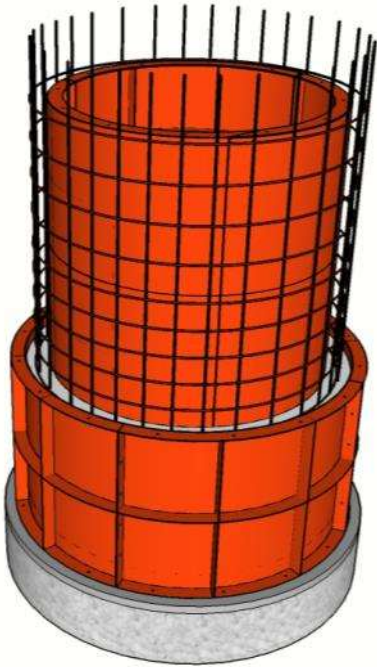
The entire wall must be casted in one day.

This step must started **early morning** to have fresh mason & labour and all the time to complete all the wall



The connection Wall / bottom slab is the place most prone to leakage:

- **Clean thoroughly with large amount of water the slab before placing the outside form.**

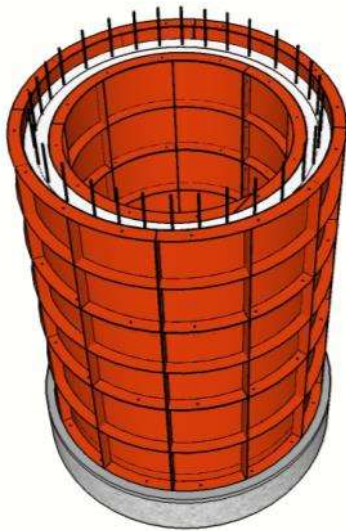


Oil the first outside formwork with burnt oil

Place it and start casting

Careful: Use only small size gravel

- ① Cast the concrete: **one bucket per one bucket rotating** around the mold (not all the concrete on the same side)
- Vibrate a lot** : The vibration teams follow the one who pour the concrete. Vibrate:
 - ② with a stick inside the concrete,
 - ③ by hitting the outside mold with a wooden hammer
 - ④ by hitting the inside mold with a wooden hammer



When the first row is completed, installed the second outer formwork and continue casting

All row must be casted the same day

The day after casting the concrete, fill the reservoir up to the top with water

Let the concrete cure during **7 days** minimum

To remove the inside mould:
Start to remove the door using a crow bar as gently as you can.



9. Cover

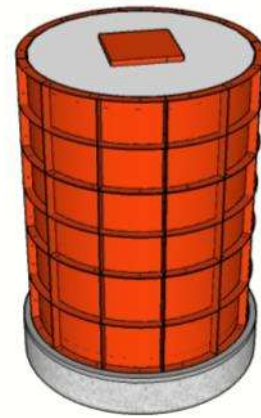
Construct a cover formwork with timber
Cast the top slab using the outside form with slope
toward the outside

For the door don't forget :

- ① to sur-elevate it
- ② to do an inside joint
- ③ to build a back rest



Let the slab rest 7 days before removing the formwork



Cut all inside pipes:

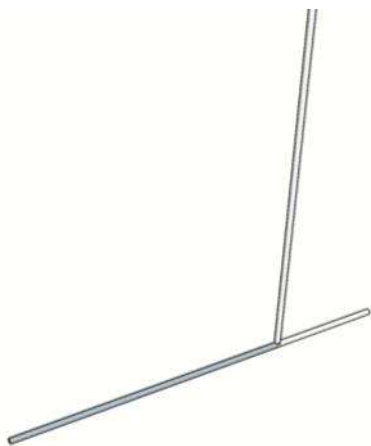
Outlet : 3 cm height

Inlet : 15 cm height

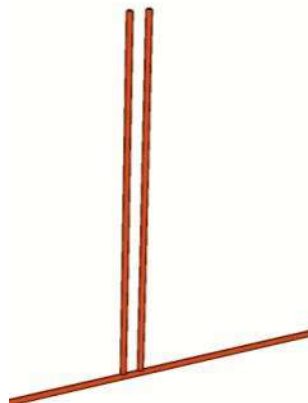
Overflow : reservoir inside height – 5cm

10. DB Reservoir: Pipes installation in foundation

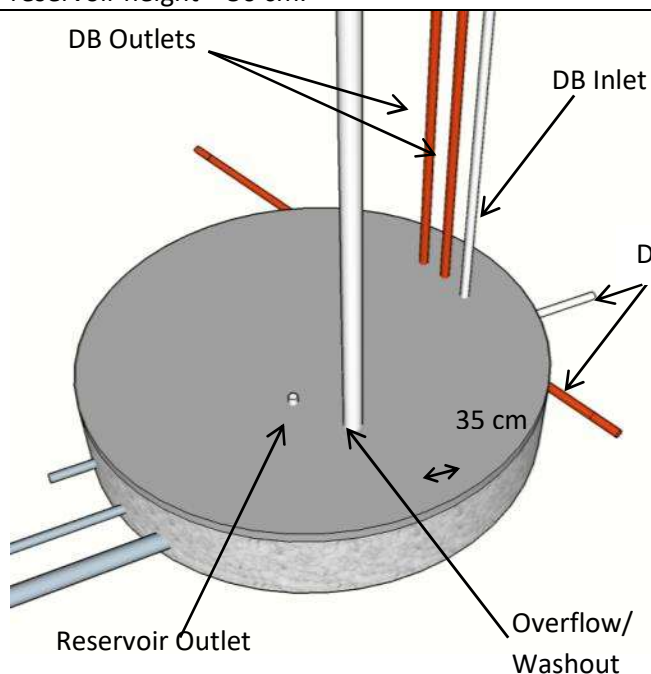
Reservoir WP + DB



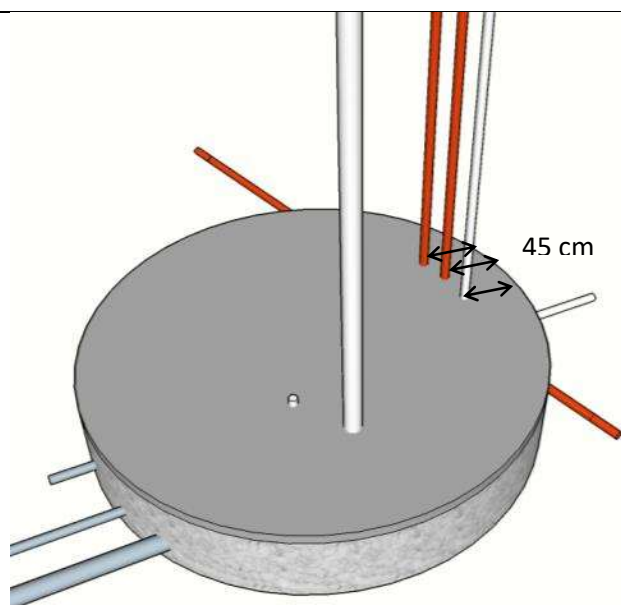
The DB inlet and outlets are made in PVC with a Tee and a GI drainage. The vertical **pipe length** is equal to the outside reservoir height + 50 cm.



If the DB has two connected outlets use two tees on the same horizontal pipes

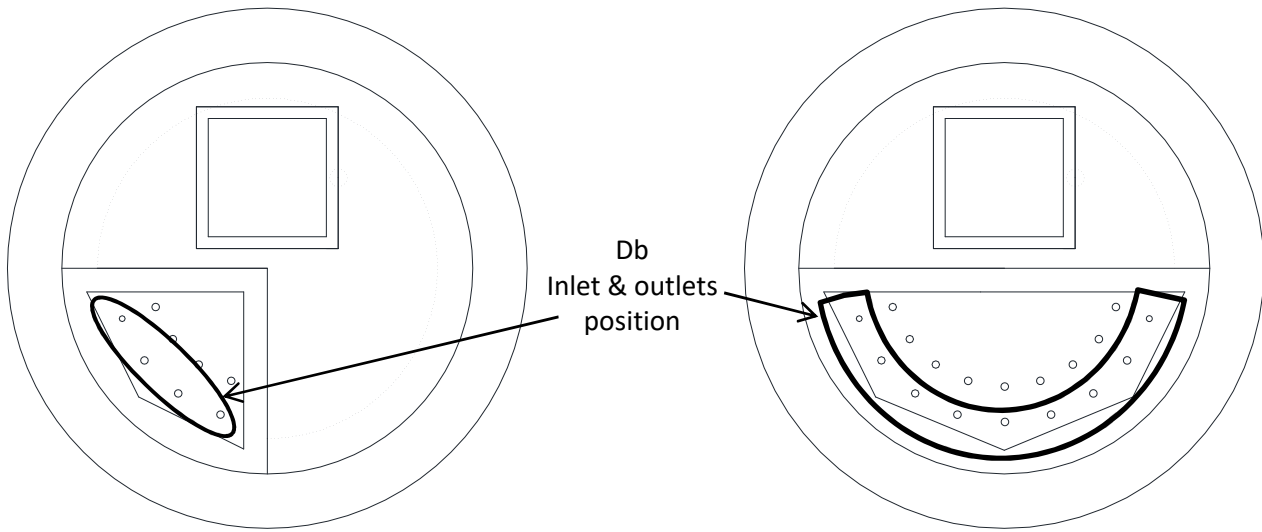


All pipes must be embedded in the reservoir foundation



DB inlet & outlet placed in circle 45 cm from border and 20 cm apart

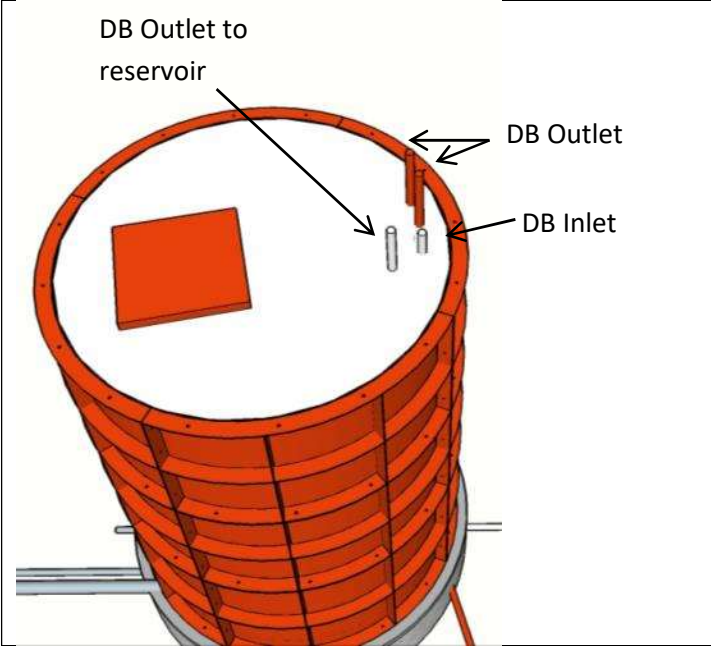
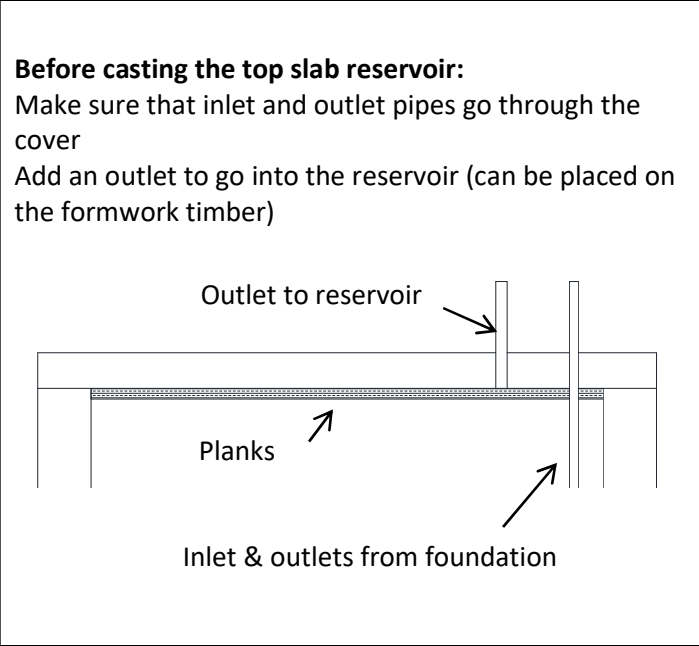
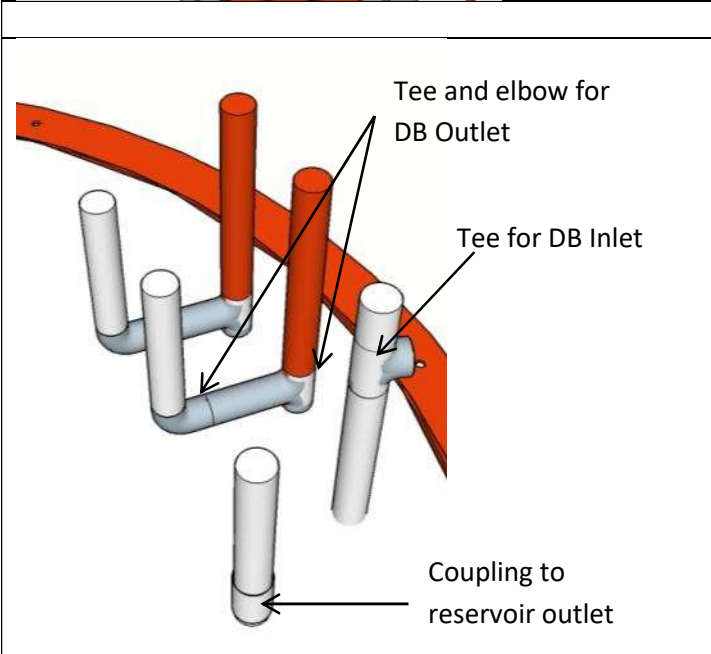
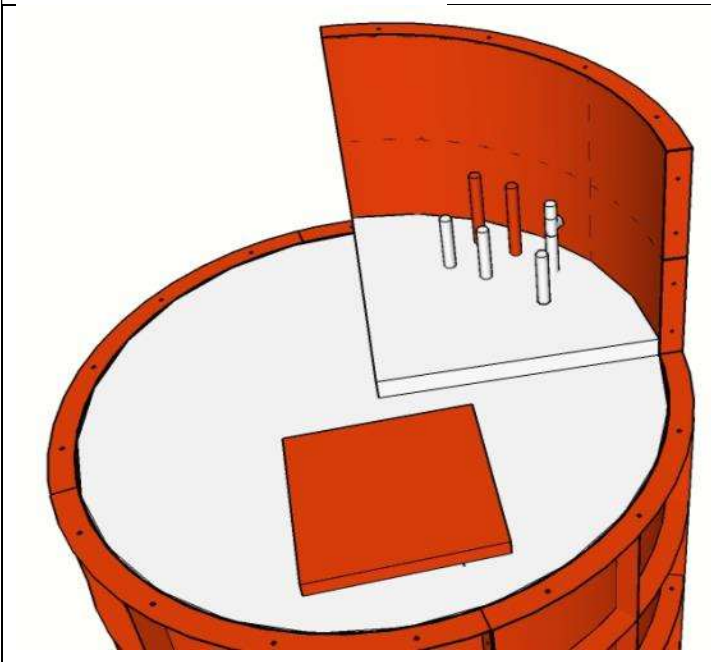
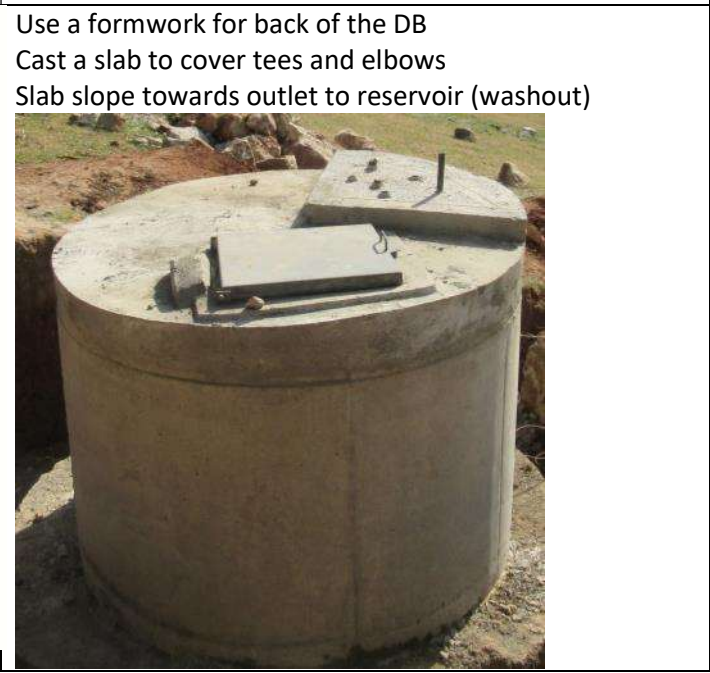
- Take care to position all pipes properly
- Reservoir overflow near to the manhole door
 - Db inlet and outlet on the opposite side



Up to 4 outlets pipes
(Including the one that goes in the reservoir)

Up to 9 outlets pipes
(Including the one that goes in the reservoir)

11. DB Reservoir: pipe inside slabs

 <p>DB Outlet to reservoir</p> <p>DB Outlet</p> <p>DB Inlet</p>	<p>Before casting the top slab reservoir:</p> <p>Make sure that inlet and outlet pipes go through the cover</p> <p>Add an outlet to go into the reservoir (can be placed on the formwork timber)</p>  <p>Outlet to reservoir</p> <p>Planks</p> <p>Inlet & outlets from foundation</p>
 <p>Tee and elbow for DB Outlet</p> <p>Tee for DB Inlet</p> <p>Coupling to reservoir outlet</p>	<p>When the top slab reservoir is finished:</p> <p>Place Tee and elbow to form the DB outlet</p> <p>Place a coupling for reservoir outlet / Washout</p>
	<p>Use a formwork for back of the DB</p> <p>Cast a slab to cover tees and elbows</p> <p>Slab slope towards outlet to reservoir (washout)</p> 

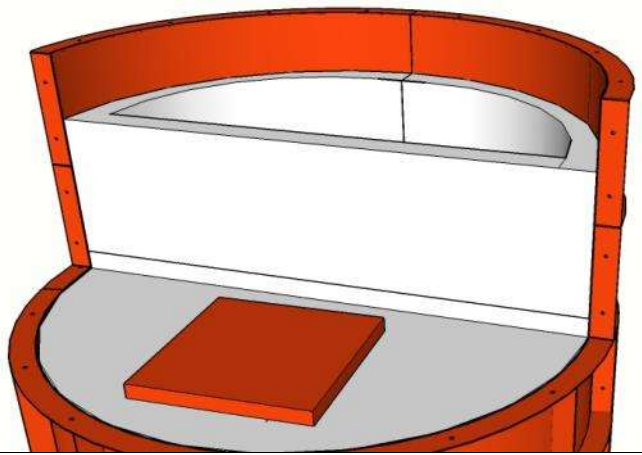
For Big DBs:

More than 4 outlets

Or

Inlet ≥ 50 mm

Use half circle DB



Use a circular formwork for back wall of DB

Height of DB 50 cm

Build a concrete slab cover (10 cm thick) with small door (sur-elevated)

Place a tee on the DB inlet, the tee height must be exactly at outlets height

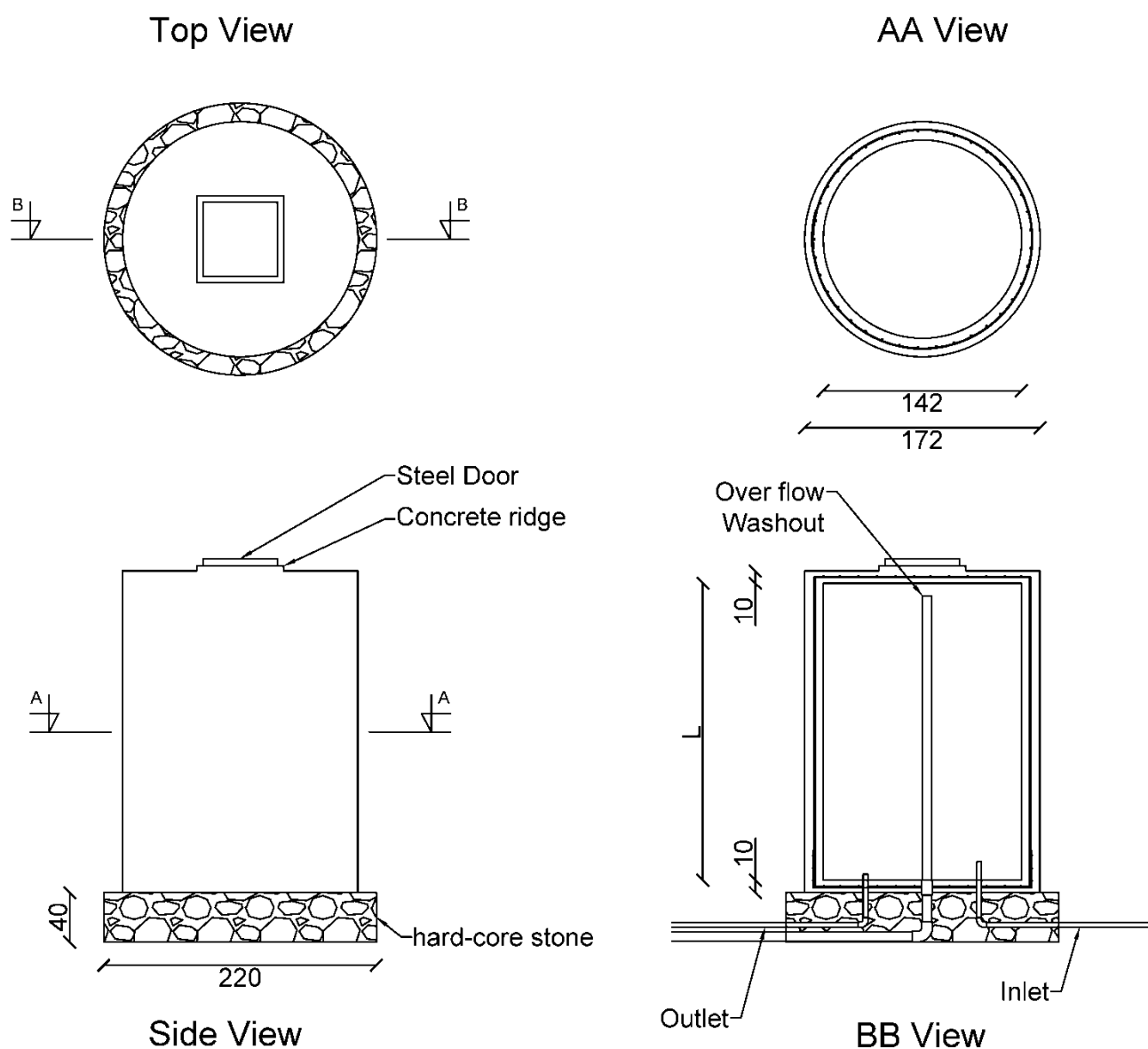


Removing the planks formwork

You can build the DB before removing the formwork
But the mason must take **extra care not to break** the
pipes passing through the reservoir



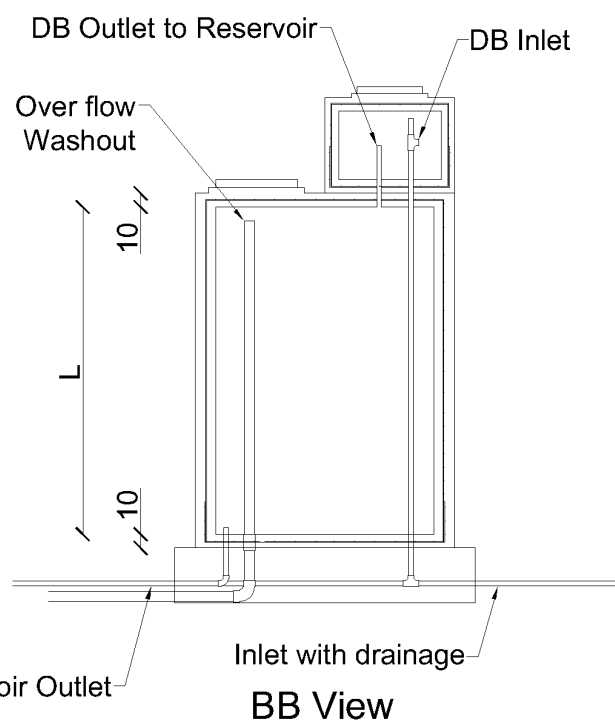
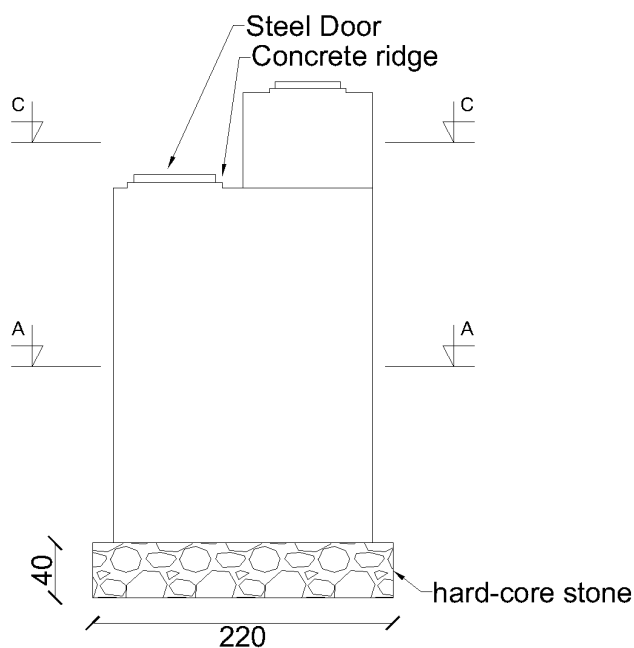
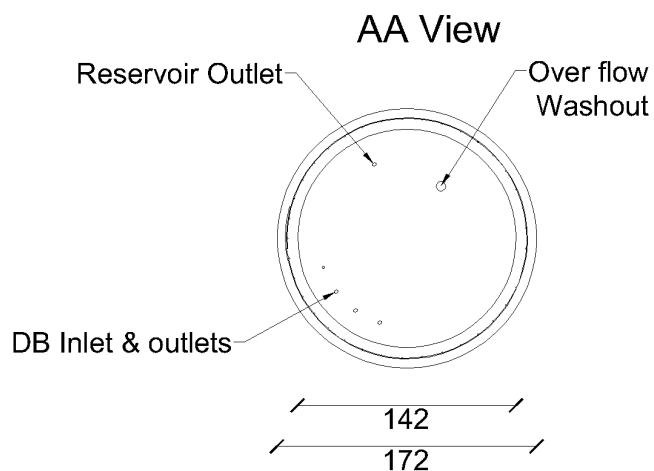
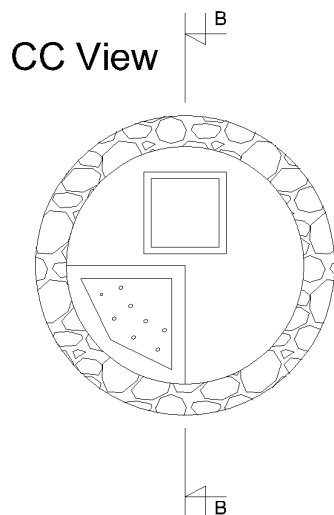
12. Reservoir Design



High of Reservoir adapted to the number of user and inlet flow	
H = 80 cm	V = 1.2 m³
H = 180 cm	V = 2.8 m³
H = 280 cm	V = 4.4 m³

Unless otherwise specified :
All concrete ratio 1 : 2 : 3

Reinforcement details			
Elements		Rebar Ø	Rebar spacing
Bottom Slab		8 mm	15 cm
Wall	Horizontal ring top section (H to H - 80cm)	6 mm	20 cm
	Hor. ring Medium sec. (H - 80 to H - 180 cm)	6 mm	15 cm
	Hor. ring lower section (H - 180 to H - 280 cm)	6 mm	10 cm
	Vertical rebar	6 mm	15 cm
Top Slab		6 mm	15 cm
Concrete Reservoir		Update: 2019	Unit: cm
		Inter Aide France	



Side View

BB View

High of Reservoir adapted to the number of user and inlet flow

H = 80 cm	V = 1.2 m ³
H = 180 cm	V = 2.8 m ³
H = 280 cm	V = 4.4 m ³

For DB design See "Standard DB"

Unless otherwise specified :
All concrete ratio 1 : 2 : 3

Reinforcement details

Elements		Rebar Ø	Rebar spacing
Bottom Slab		8 mm	15 cm
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Top Slab		6 mm	15 cm

Concrete Reservoir DB

Update: 2019

Unit: cm

Inter Aide France