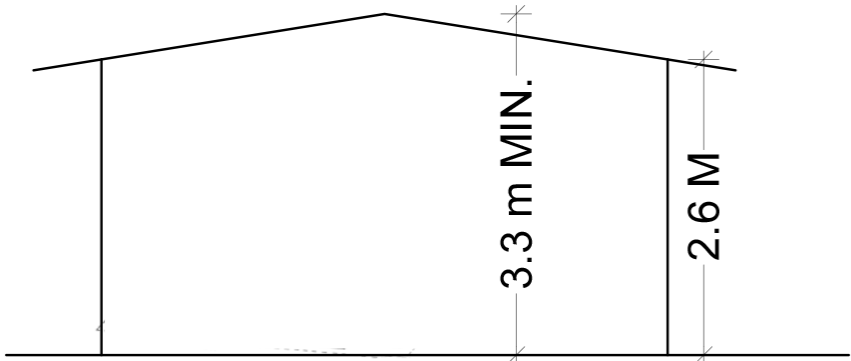
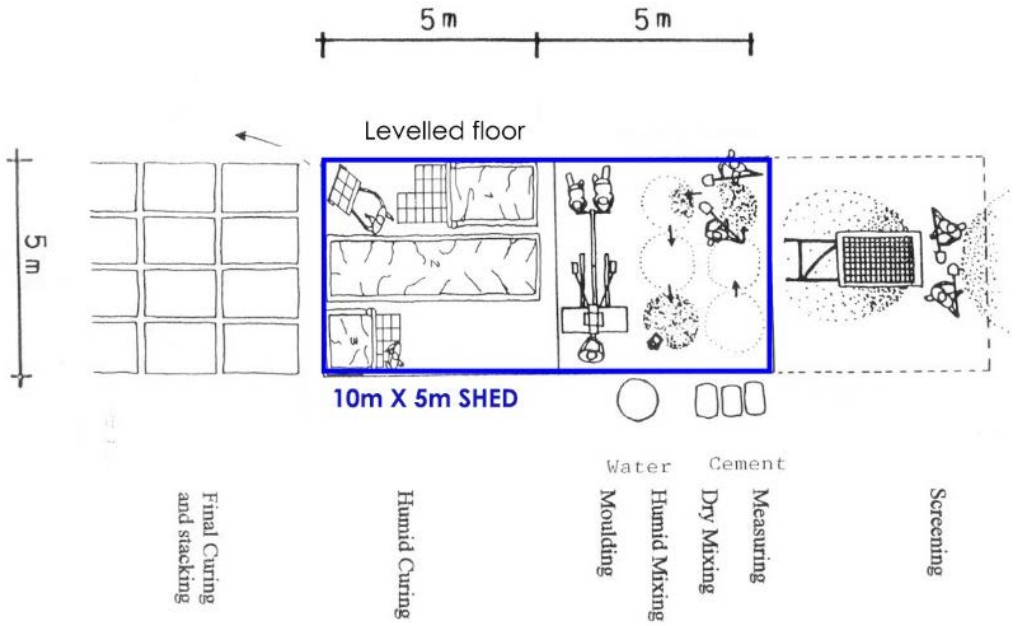


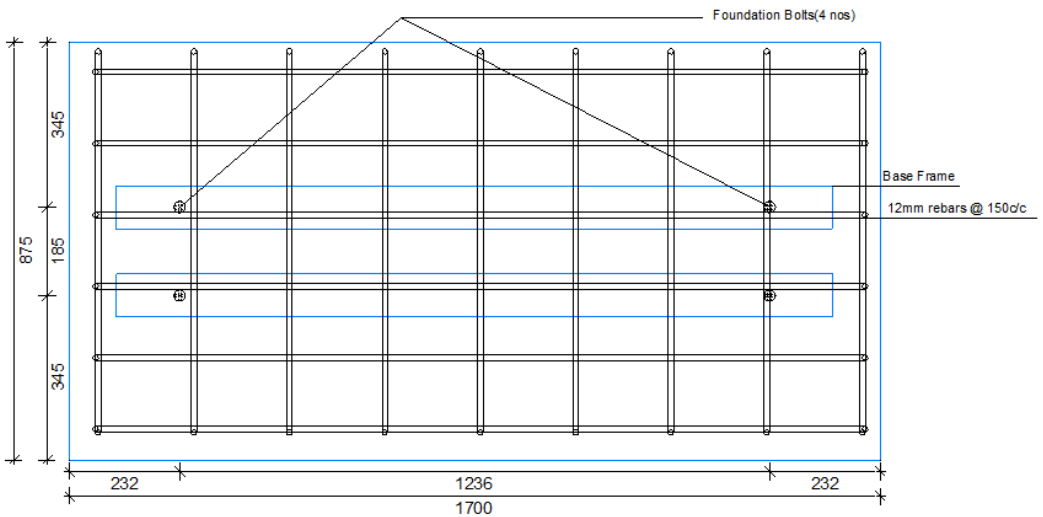
# Interlocking Brick (CSEB) Production Manual Build up Nepal 2018



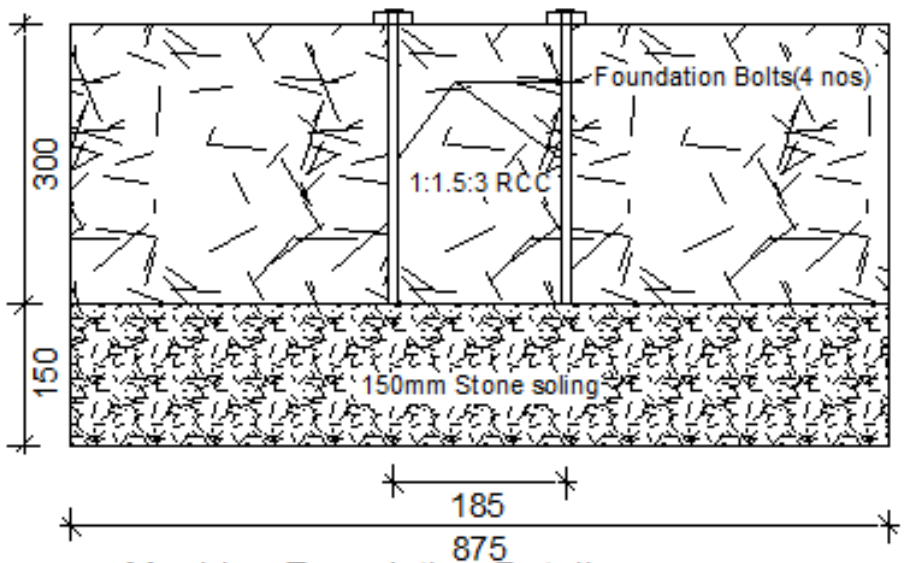
# Setup of production unit



# Machine Foundation Details



Machine Foundation Details (Plan)



Machine Foundation Details

# Materials for machine foundation

Material	Quantity
Cement	4 bags
Sand	8 bags
Aggregate	18 bags
Reinforcement 12 mm diameter	15 kg (details below)

## Reinforcement details

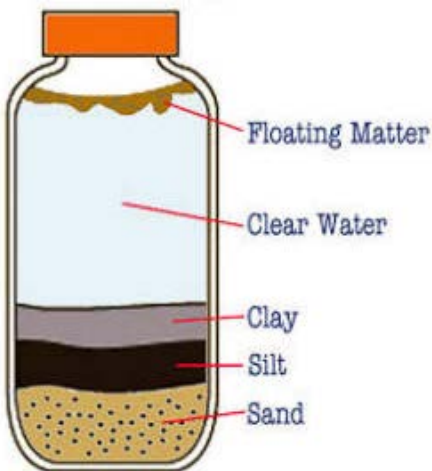
Diameter	No.	length(m)
12	6	1.60
12	9	0.78

# Soil test – water pouring test



1. Use a jar or a cut off water bottle.
2. Fill the jar up to 5 cm with soil
3. Fill water to the top and stir/shake
4. Wait 2 min for the sand to sink
5. Carefully pour away the top water
6. Repeat the process 10 times until the water is nearly transparent
7. This method will remove all silt and clay. Remaining in the bottle is only sand and gravel.

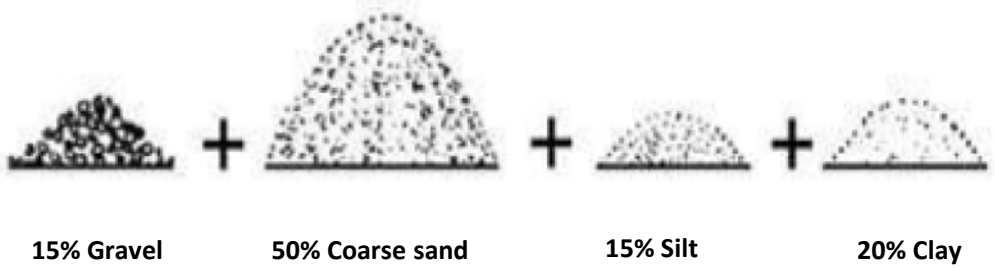
## Soil test – Water Jar test



1. Fill bottle with 5 cm dry soil. Mark the side of the bottle with marker.
2. Fill water up to  $\frac{3}{4}$  height
3. Add 1 spoon of salt
4. Close the bottle and shake it.
5. Wait for 2-4 hours
6. Measure the height of each layer

# How to mix the soil

## Perfect soil composition



Mix the soil to ensure that the volume of Sand & Gravel is 65%

## Soil mixing table

Soil content		How to mix			Composition after mix	
Gravel & sand	Silt & clay	Soil	Coarse sand	Cement	Gravel & sand	Silt & clay
5%	95%	3	6	1.2*	68%	32%
10%	90%	3.5	5.5	1.0	65%	35%
20%	80%	4	5	1	64%	36%
30%	70%	4.5	4.5	1.0	65%	35%
40%	60%	5	4	1	67%	33%
50%	50%	6	3	1	67%	33%
60%	40%	8	1	1	64%	36%
65%	35%	9	0	1	65%	35%

\* If there is less than 10% sand in the soil additional cement needs to be added.

1. Carefully sieve the soil to remove big stones and lumps of clay





**2. Dry mixing - Add cement then mix the soil until it has a uniform color.**



Pour the stabiliser last



Mix minimum 2 times



Always move the pile while mixing



**3. Mix again after adding water**



Pour water onto the dry mix

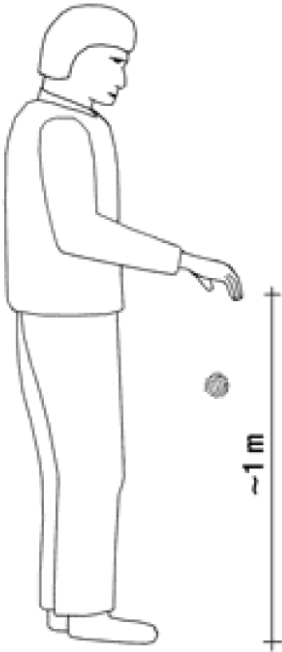


Mix a first time

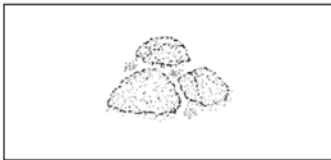


Mix 2<sup>nd</sup> time & crush lumps by hand

#### 4. Check the moisture by drop test



1. Compress a ball of soil in your hand as hard as you can.
2. Drop the ball from 1 m
3. If the ball breaks in 3-4 pieces moisture is good
4. If the ball breaks in many pieces it is too dry
5. If the ball does not break it is too wet.



3-4 pieces = Mix is OK



Ball bursts apart = Mix too dry



Ball is in shape = Mix too wet



# Machine safety

1. No children at the work site, Do not allow children to play with the machine.
2. No one shall stand behind the lever. If anyone is watching they shall stand on the side or in front of the machine.
3. When cleaning the machine, be carefull as the mould has some sharp edges.

## **IMPORTANT!**

The SAME PERSON shall fill the mould and close the lid. This way there is no risk of injuring the fingers when closing the machine.



# Machine operation



## IMPORTANT

Before closing the lid of the machine clean the sides of the mould carefully.

Make sure all metal surfaces are clean from soil and sand.

This is very important. If soil or small stones are still on the mould there is a risk of breaking the machine.



**Pour the mix in the machine, press down by hand to fit more soil. CLEAN the sides of the mold before closing the lid and making the brick.**

# Quality check – first brick in each batch.

1. Measure the block height on all sides
2. Ensure there are no cracks in the brick



Measure block height



## Stacking and curing

Keep the bricks for minimum 24 hours in shadow or cover by tarp until the cement will set. Then move them to final location and do curing for 21 days. Write the production date on the side of one brick for each batch.



**After each brick, check if the mould require cleaning.**



**What to do if the brick is too soft?**

- Check that your mix is correct.
- Add more sand in the mix
- Use less water
- Add more mixed soil in the machine
- Change the compression in the machine

**What to do if the lever is too hard to compress?**

- Add a bit more water to the mix
- Change the compression in the machine
- Add less soil in the machine

## Quality control after 48 hours

- Check for cracks
- Check for broken edges
- Make sure the edge of the brick does not crumble if you try to break with your fingers

## Quality control after 7 days

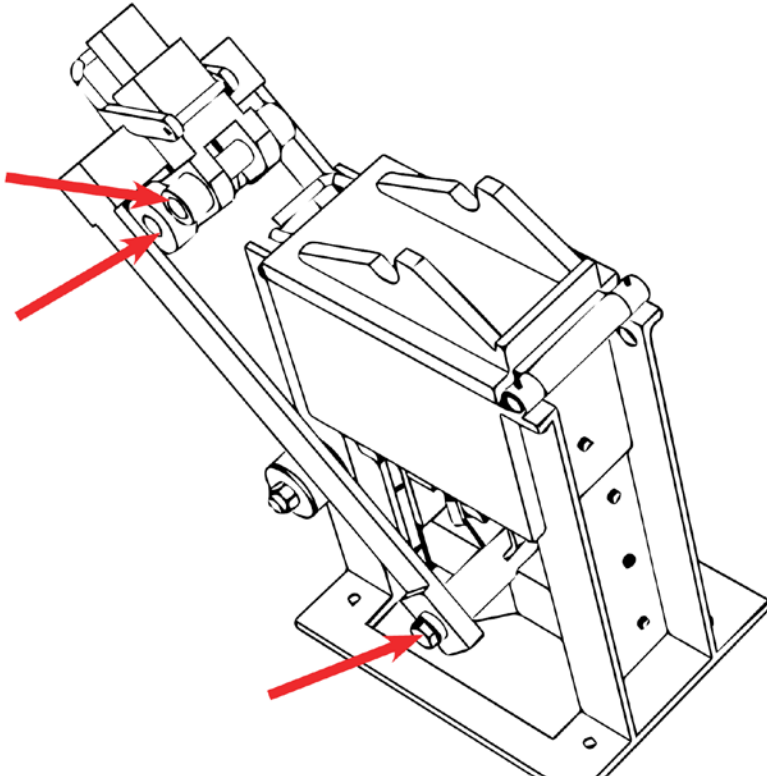
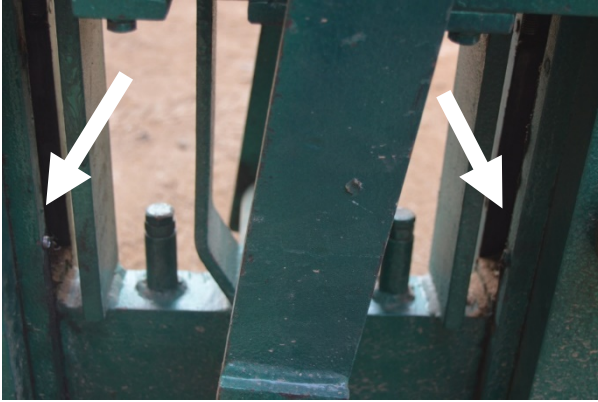
- Soak the brick in water for 2 hours. Make sure it does not disintegrate.
- Break one brick and check inside. Make sure there are no lumps of clay where the cement has not been mixed.

# Adjust brick height, balance & compression

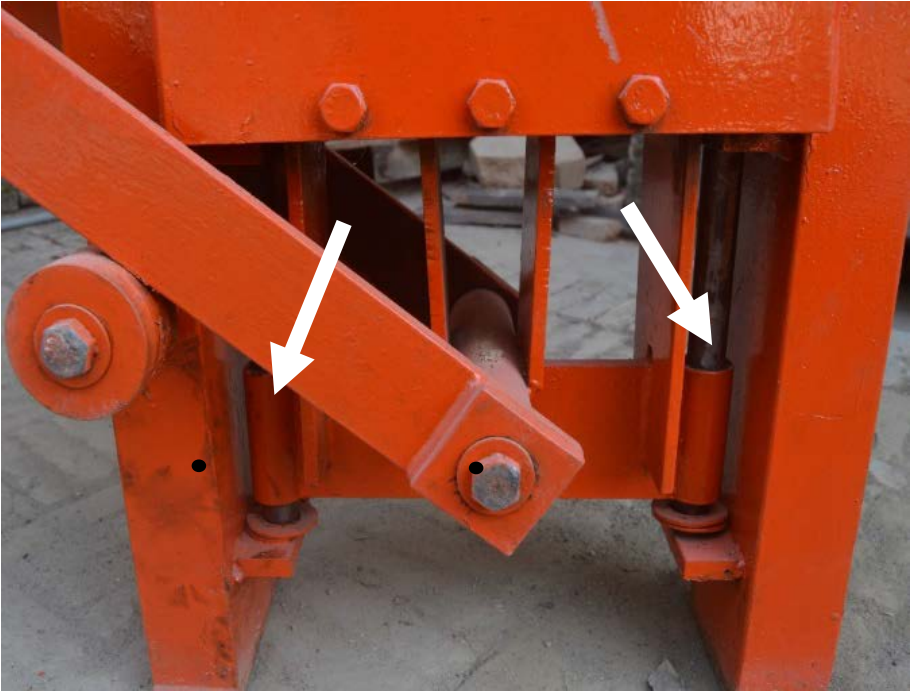


# Daily maintenance – VERY important

1. Clean the machine carefully. Especially mould and guide
2. Oil the mould and grease the guide
3. Oil/grease all moving part as indicated below







## Weekly maintenance

Grease or oil the moving parts

