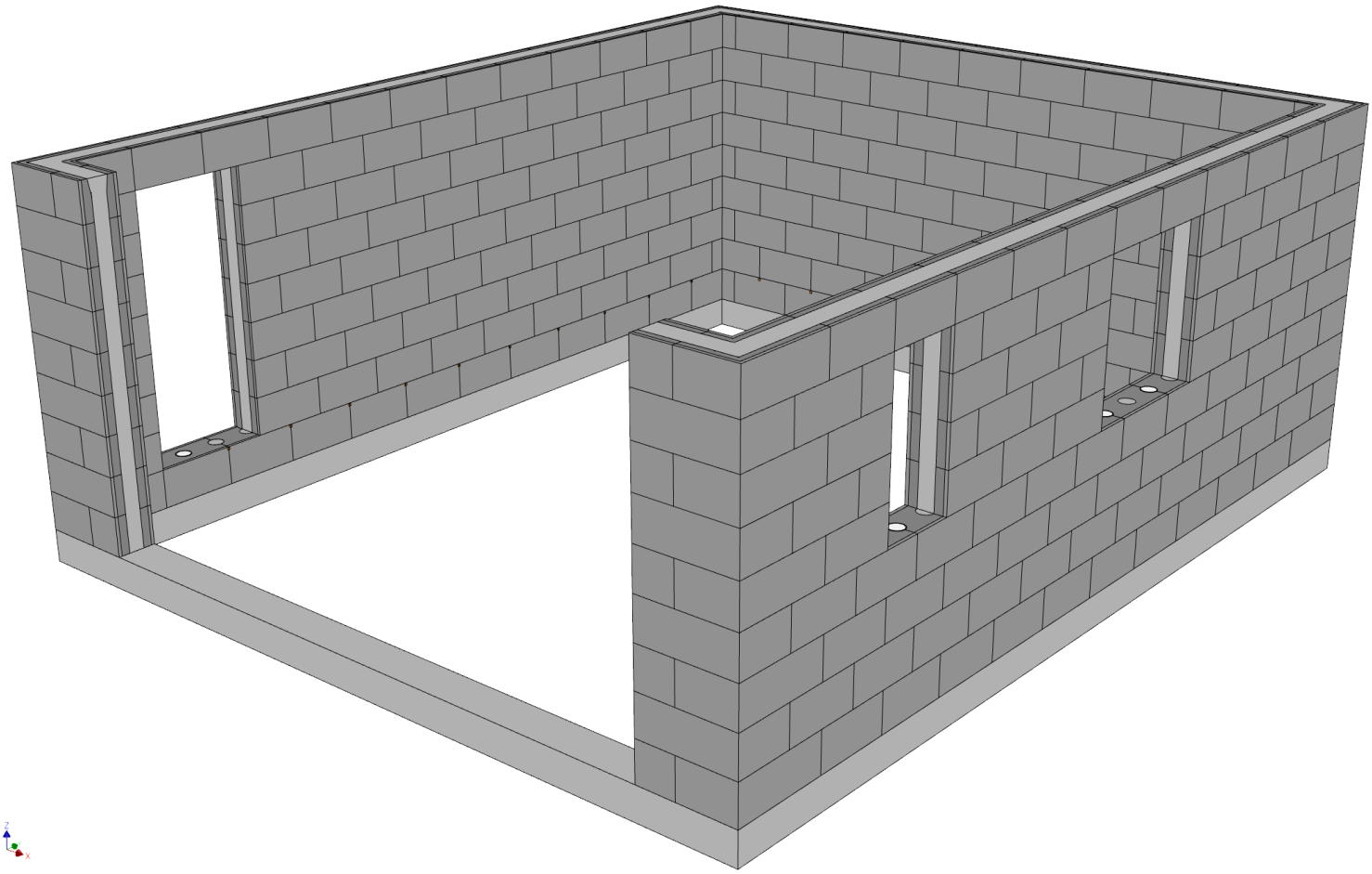
Building Principle – SMARTBLOC SYSTEM I

Picture below shows the garage finished casted.



In this description, we will review the principles for how to build in SMARTBLOC SYSTEM I, on an already foundation. This example shows freestanding garage adapted to SMARTBLOC SYSTEM I

The principle will also be the same for other buildings, but statics must be safeguarded in relation to loads, wind loads and with backfilling.

External dimensions: 7.5 x 6.3m = 47.25m^2
Outgoing diagonal: 9795 mm
Heigth from foundation: 2.7m

Internal dimensions: 6.9m x 5.7m. = 39.33m^2
Internal diagonal: 8945 mm

The ring wall on the example has a height of 30cm, before starting up check the diagonals and heights of the ring wall. Settle any major deviations before starting blocking, i.e. larger than 0.5cm.

For best results, please refer to: Tolerance requirements for concrete worker NS3420 utg. 2008 Tolerance class PB, RB.

Openings:

Garage Gate: 4,8 x 2,4m
Door: 0,9 x 2,1m
Window 1: 0,6 x 1,2m
Window 2: 1,2 x 1,2m

Sum of Openings: 15,57 m2

Material consumption:

SMARTBLOC SYSTEM I
46m^2

(Steel armature for free-standing wall)

37 pcs. 0,7m Ø12mm
37 pcs. 2,65m Ø12mm (or 3 x 12 mm and CC 300 mm 12 mm reinforcement when backfilling the wall. See our diagram / table for backfilling)
1 pcs. 1,2m Ø12mm
Sum: 125,15m

Toleransekrav for betongarbeider (NS3420 utg. 2008)

Planhetstoleranse		
Type toleranse	Målelengde meter	Toleranseklasse PB
Lokal planhet (svanker og bulninger)	2,0 m	± 3 mm
	1,0 m	± 2 mm
	0,25 m	± 1 mm
Retningstoleranse		
Type toleranse	Målelengde meter	Toleranseklasse RB
Helning / loddavvik	> 5,0	± 3 mm
	2,0 - 5,0	± 2 mm
	< 2,0	± 1 mm

(steel armature for backfilled wall see separate document

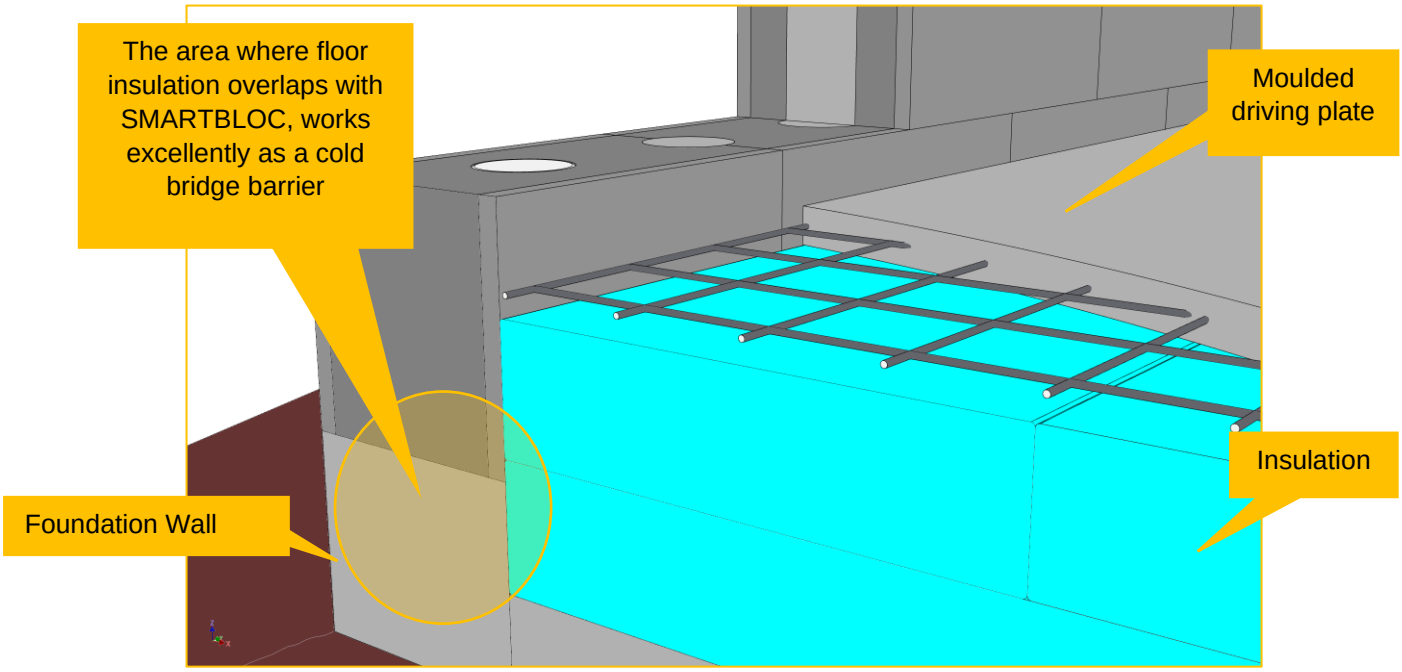
(Lintel Armuture Steel in «U-BLOC»)
9 pcs. 6m Ø12mm
6 pcs. 1,8m Ø12mm
12 pcs 90° 0,6 x 0,6m Ø12mm
Sum: 79,2m

Concrete consumption:
B30 Concrete approx. 1200L
Slump 220 with 0.8 grains (also called fine batch)

Ideal number of people. 2-3 pcs.

The first shift with SMARTBLOC in this description is used as a cold bridge barrier between the ring wall and the internal plate.

The picture below shows the principle.



For uninsulated flooring, the floor can be cast against foundation or the first level with SMARTBLOC.

Mark insulation / Tele-securing of the ground is situational and place dependent.

References to Construction norms :

514.221 External moisture protection of buildings.
521.112 Floor on the ground with ring wall. Tele-fuse and thermal insulation of heated buildings.
521.811 Protection against frost of unheated buildings and structures.

Equipment that can be used:

Hand saw LECA

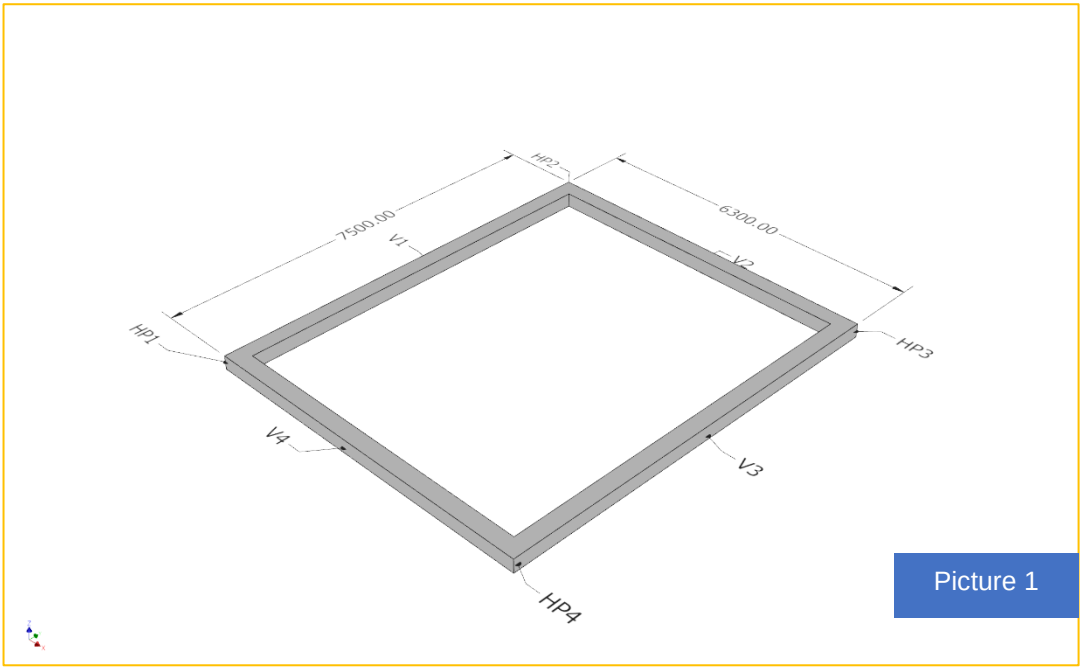
Hand saw for LECA and porous cement.

Recoil-free hammer.

Impact drill, concrete drill Ø12mm 400mm long.
Hammer and formwork nails.
Concrete nails (fastening saws / bevel tables)
Three wedges
Masonry cord
For larger projects, we recommend similar equipment to LISSMAC

https://www.diaproff.no/lissmac-bandsag-mbs-510-230v-1-5kw-inkludert-sag-band.html

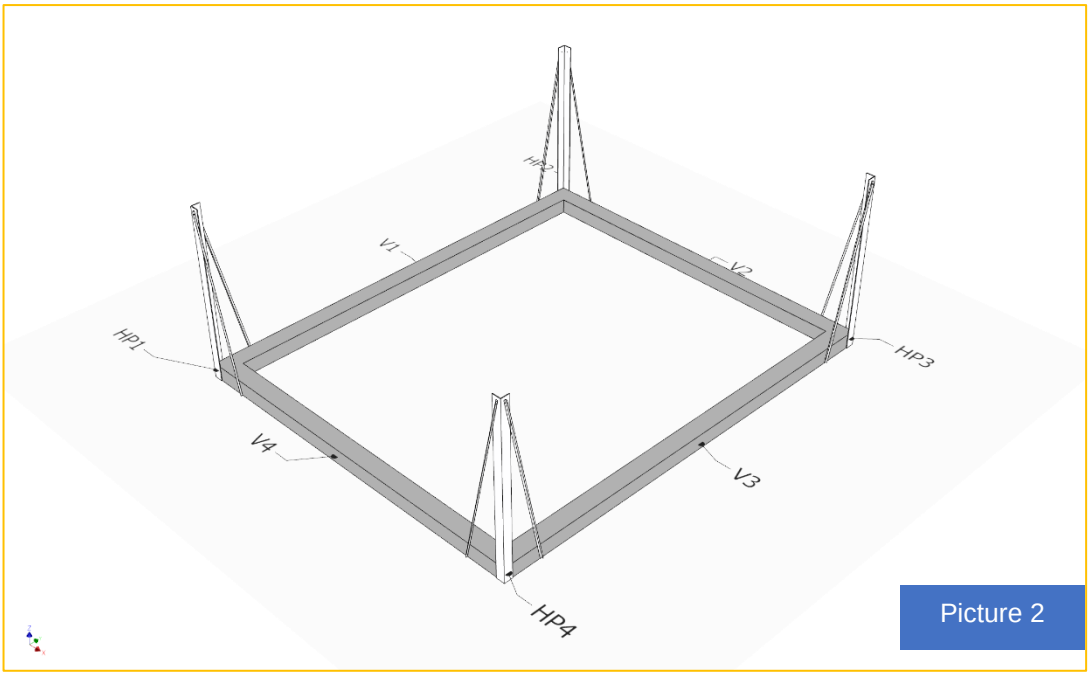
1. Startup



Picture 1

Foundation ready for blocking. Check the diagonal, in this description it is 9795mm

Alternatively, cast plate with fundament and blocks placed directly on plate.

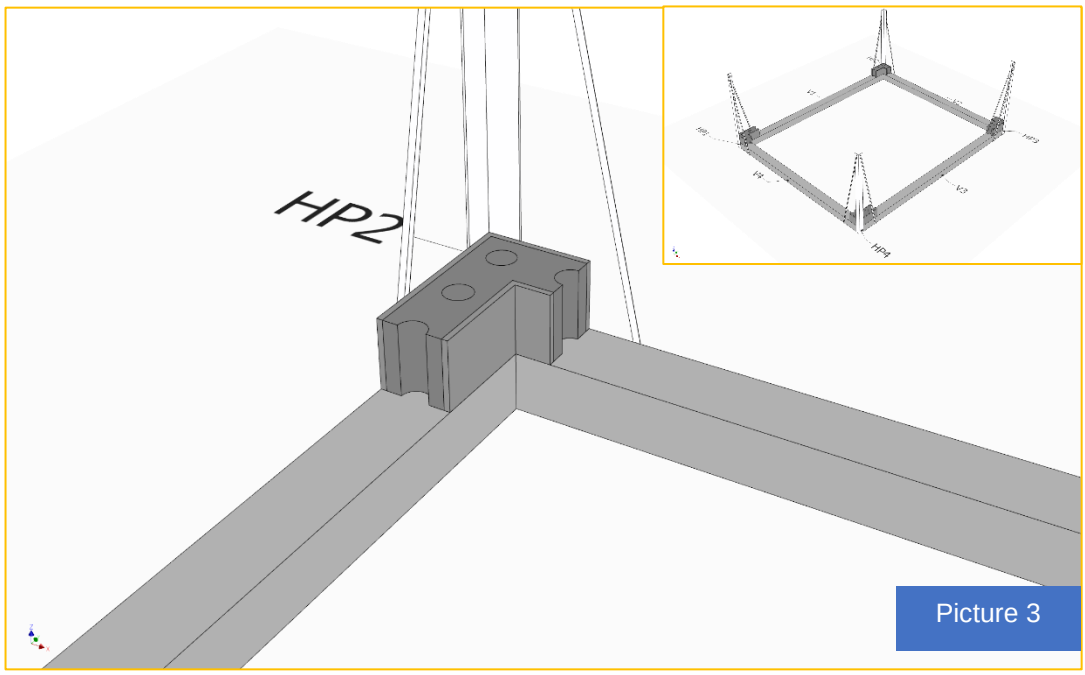


Picture 2

Set corners posts in every corner. In this description, posts made of aluminum profiles are used, but these can also be built with formwork materials.

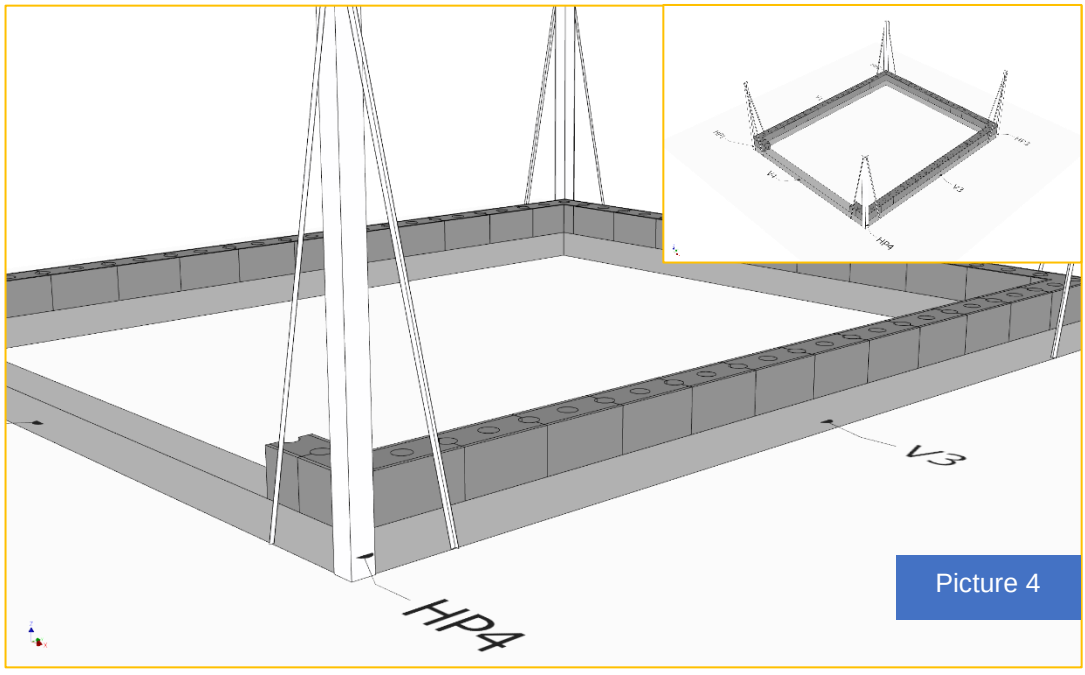
corner posts are soldered and braced with a sloping table. On the corner posts, the top of the wall (2.7m) is marked from the top of the foundation. If you transfer it with level or laser level to the other corner posts, also check the diagonal.

Then mark each shift down. SMARTBLOC SYSTEM I is 30cm, which is one shift (row)



Picture 3

L-BLOC is put in every corner. Check that the direction of the L-BLOC is correct so that the measurement between the L-BLOC (corner block) and the next L-BLOC corresponds to the number of N-BLOC (normal block) (the distance can be divided by 60cm and you get an integer) remove locking pins from the L-BLOC. (pre-posted, see figure 8)

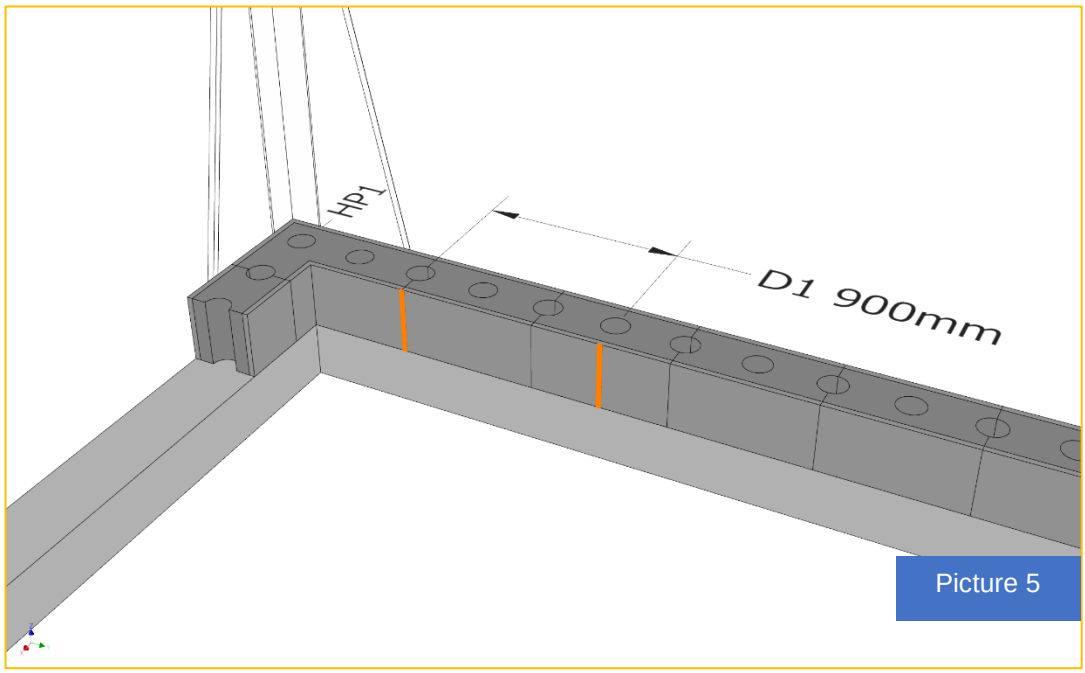


Picture 4

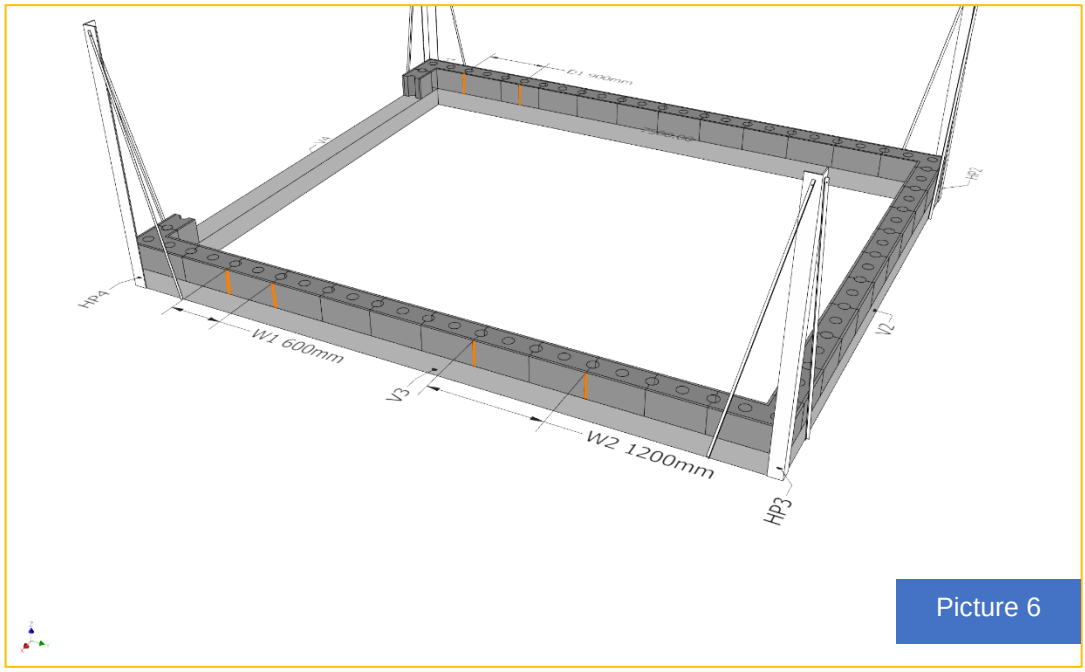
Remove guide pins from the N-BLOC, fill the N-BLOC between corner blocks. (L-BLOC) be sure to push the blocks firmly close together. Keep the direction with masonry cords.

TIP: ***Notice that the block is finely cut on top, it will be better result if that side is up when you lay out the blocks.***

2. Marking

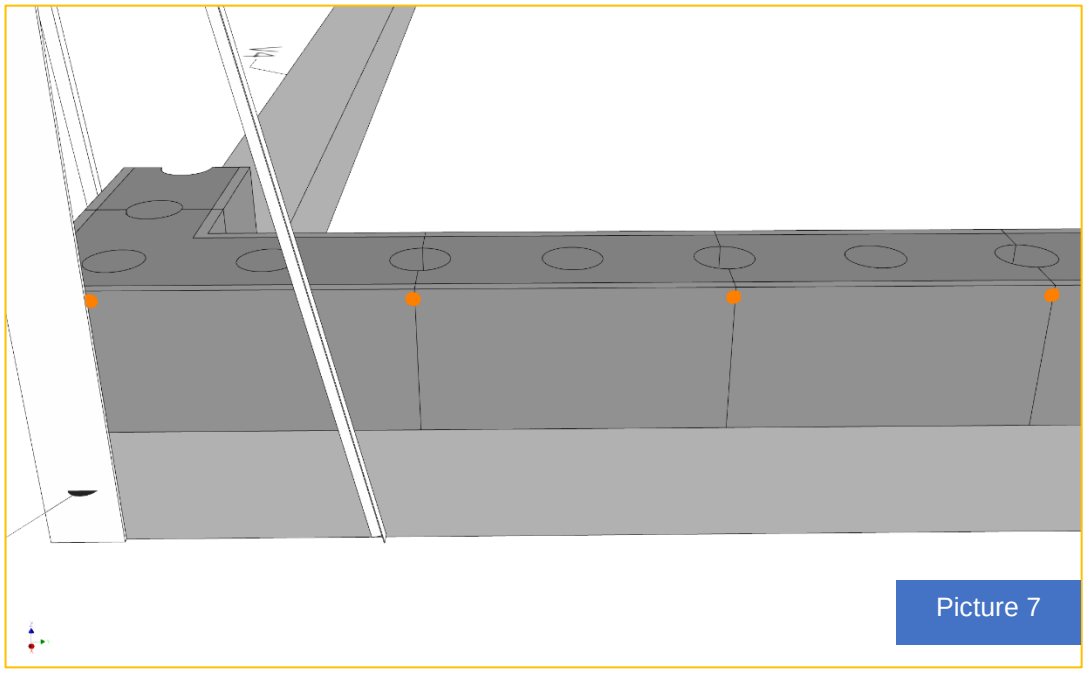


Picture 5



Picture 6

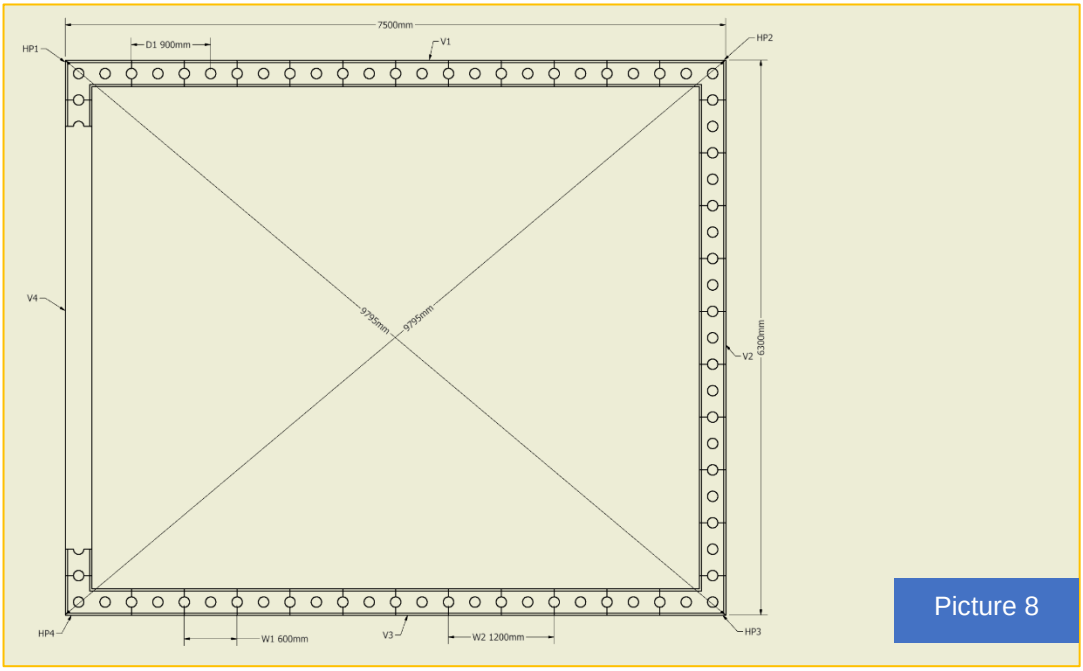
TIP:***Mark doors and windows with a <u>line.</u> Use a highlighter or spray paint .***



Picture 7

TIP: ***After doors and windows are marked. So, it is also good practice to mark all holes for concrete pillars. Mark again on the 6th row.***

3. Control

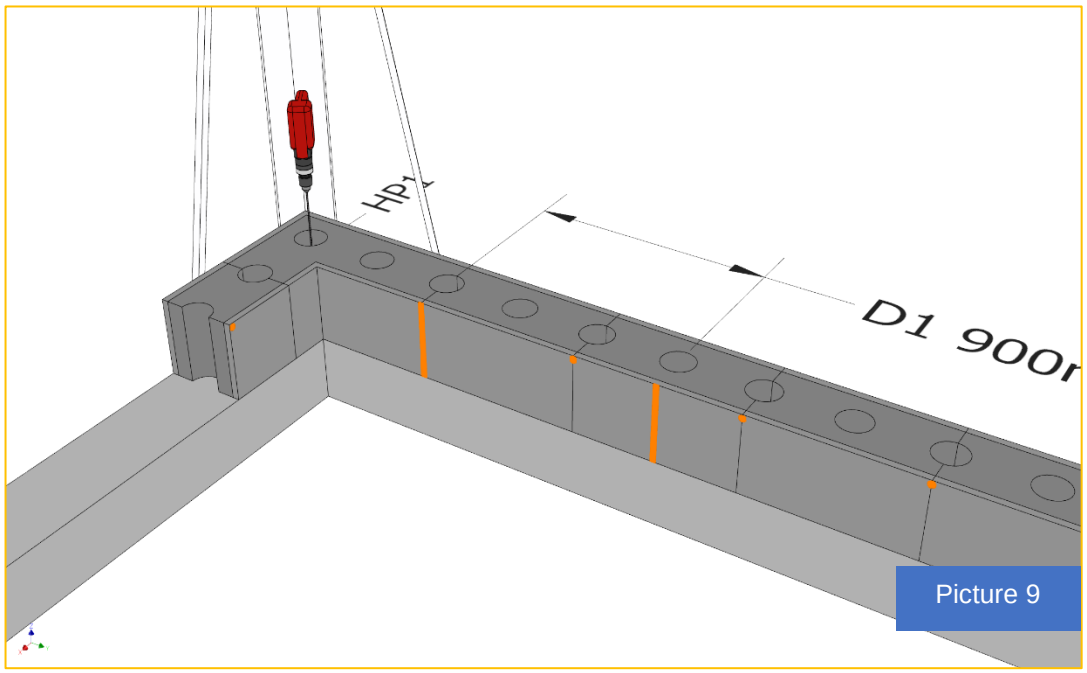


Picture 8

Before proceeding drilling, diagonals are checked. From HP1 to HP3, 9795mm is measured outside edge. The diagonal from HP2 to HP4 should be the same as from HP1 to HP3!

HP is short for "Corner Point"

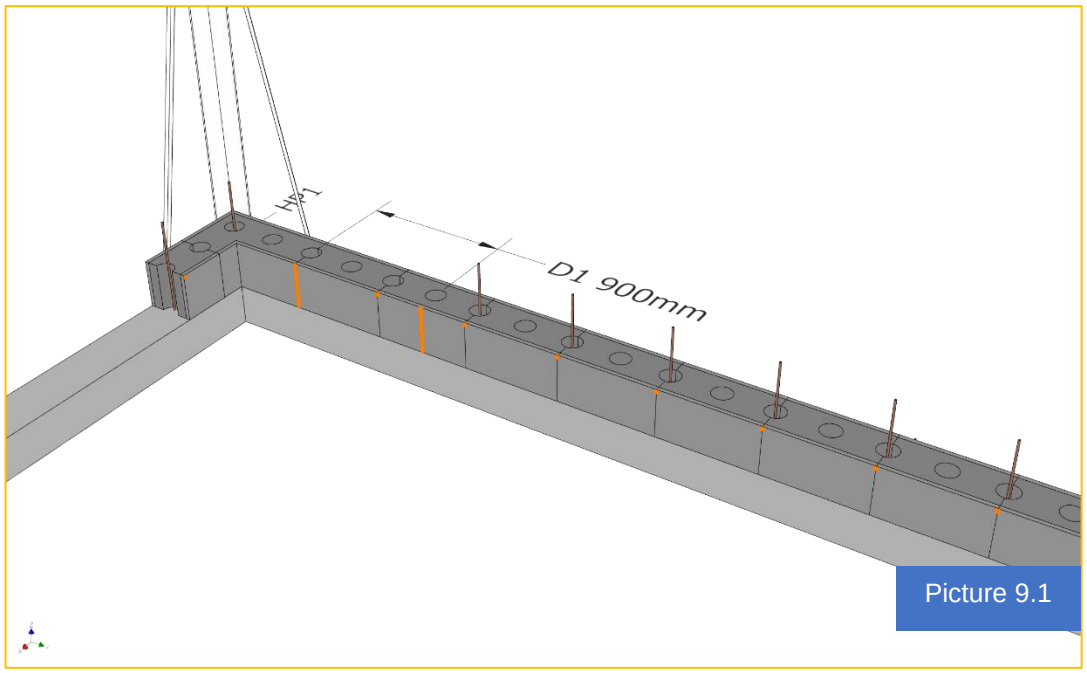
4. Drilling for reinforcement



Picture 9

Use impact drill with Ø12mm, 400mm long concrete drill. Drill down 10cm in the centre of corner holes and continue with every 60cm to the next corner, all the way around. Jump over the gaps between the door and windows for now. Blow or suck out dust from the hole, this increases friction between steel rebar and concrete. Hammer down the 70cm long Ø12mm rebar 10cm into the foundation. (applies to rule for reinforcement, 50 x diameter and anchoring method) If you follow our "Tip" for tagging, more people can participate.

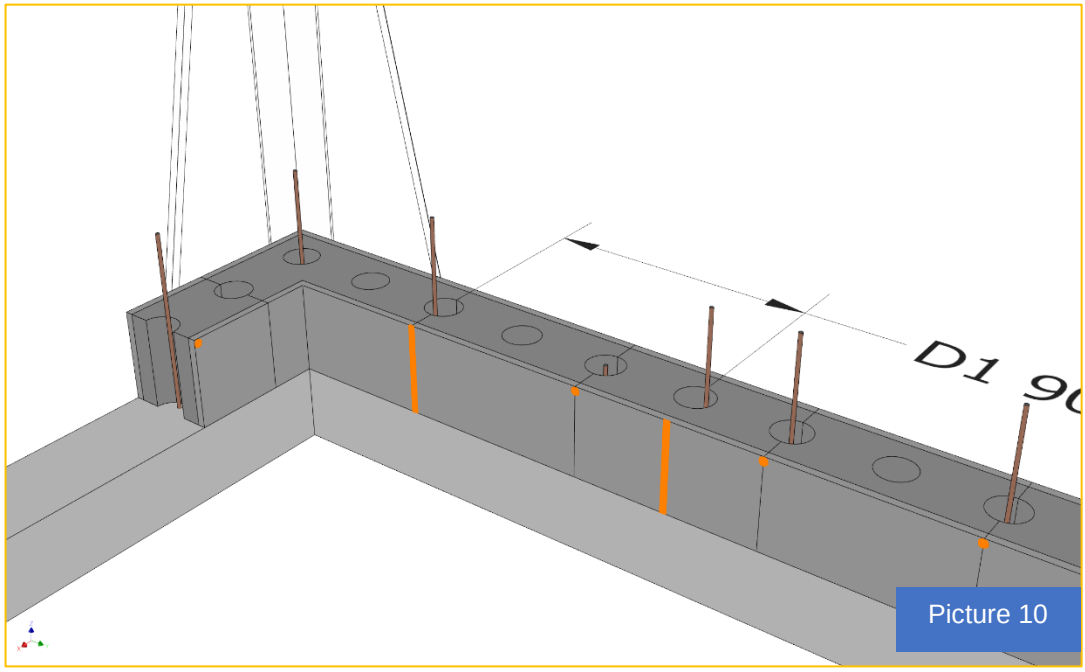
PS see our diagram / table for reinforcement when backfilling



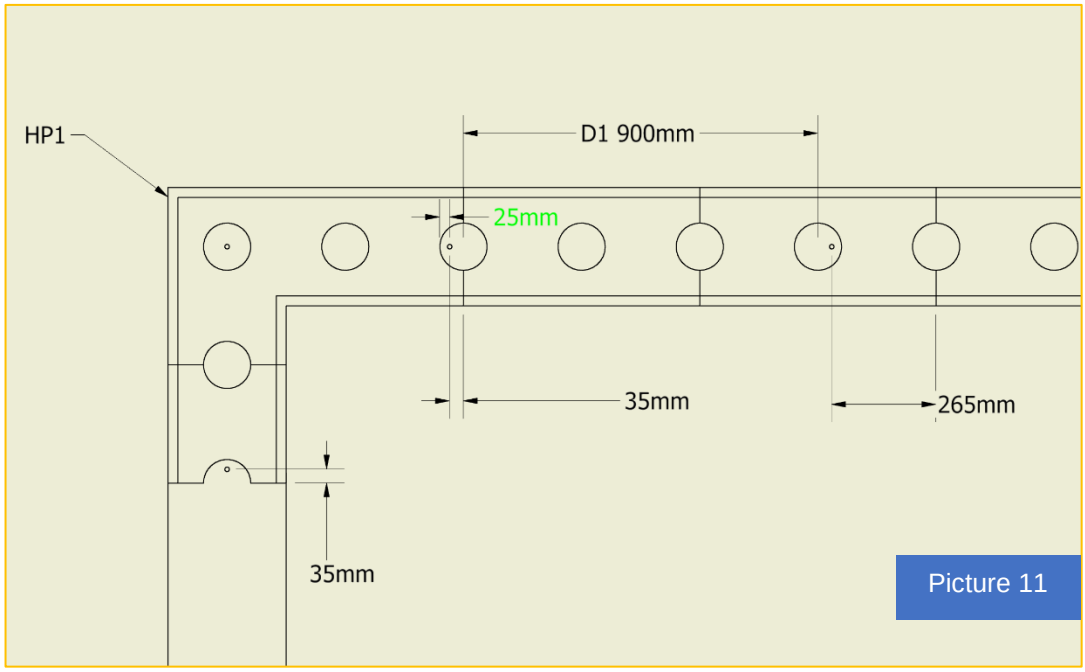
Picture 9.1

Next chapter we put the steel reinforcement for door.

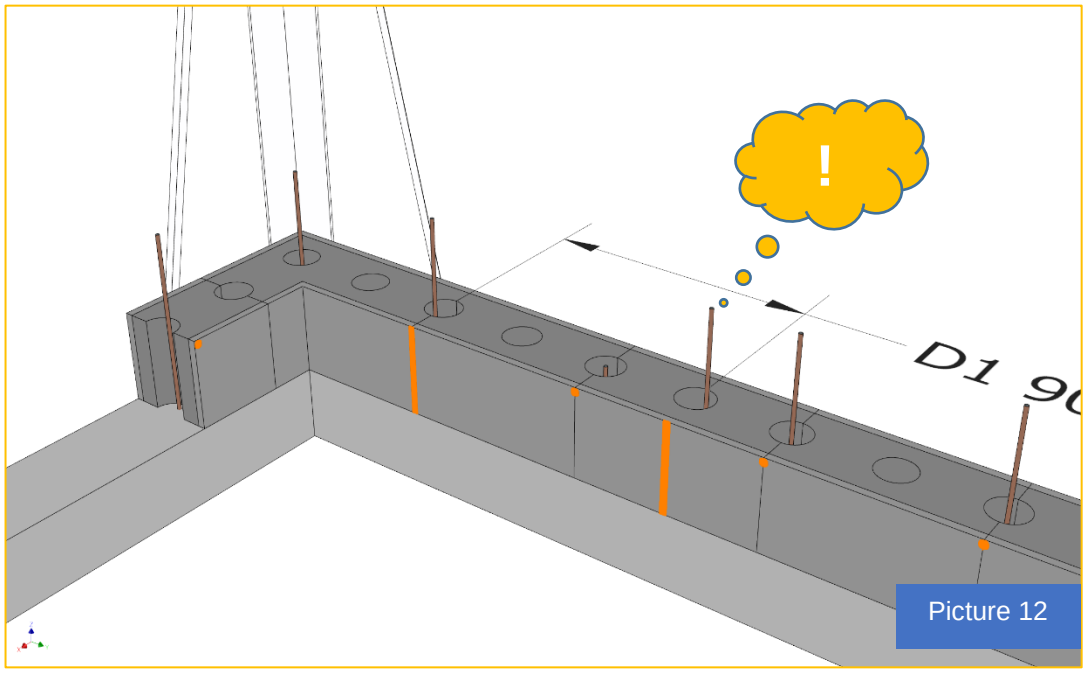
5. Detail of steel reinforcement of door, windows and gate.



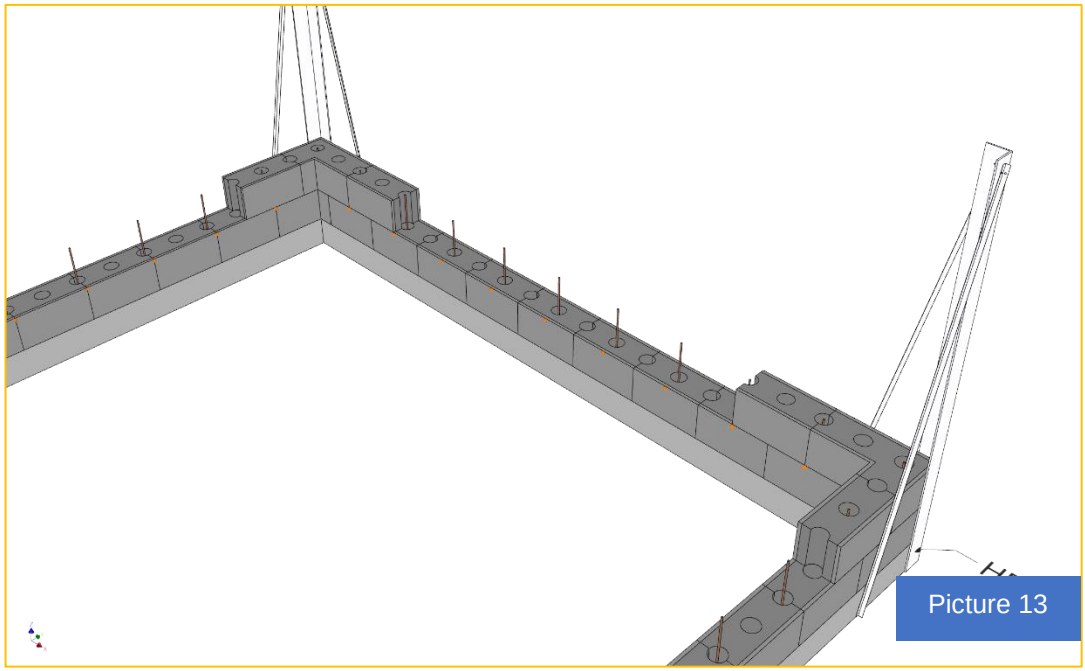
In this description we use an M9 x M21 door (89cm wide x 209cm high) the opening is 90cm. For the best possible fixing for door frame, cast half concrete pillars on each side of the door.



Technical drawing shows that in the case of "Figure 10" the rebar that is placed on each side of the door should have sufficient concrete covering. Marked in green shows 25mm from the centre of Ø12mm rebar and against the wall in the hole. The distance can then be measured to 25mm minus 6mm = 19mm cover. Minimum reinforcement cover should not be less than 15mm. The same principle also applies to windows and gate in this example. How we proceed we get back to.

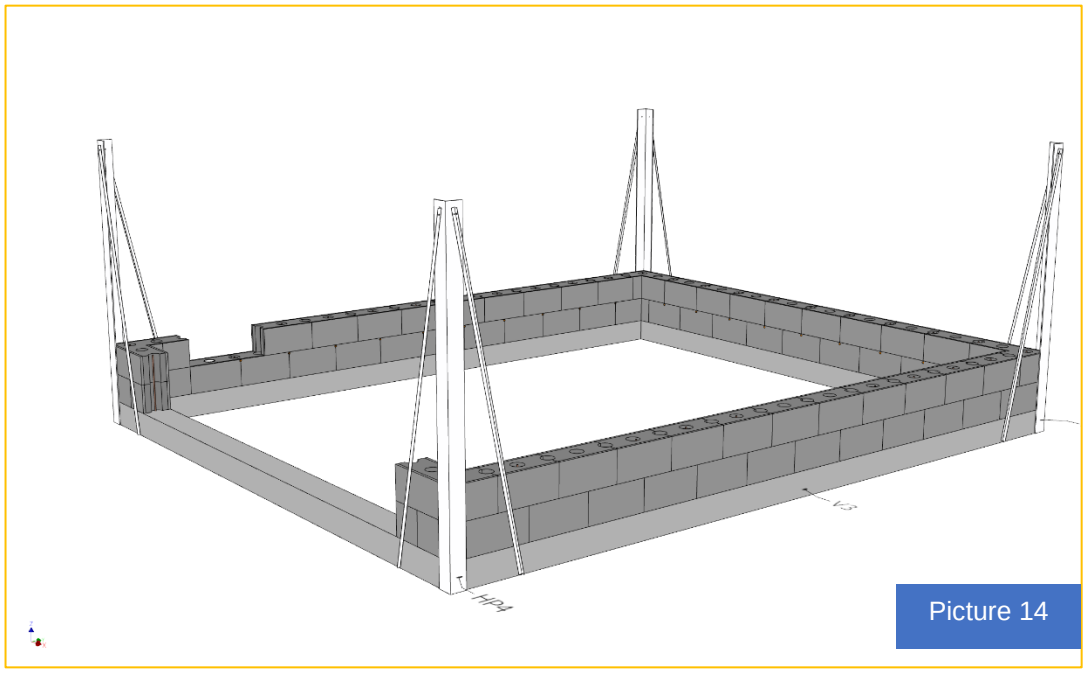


"Figure 12" Indicates that concrete pillars do not go up every 60cm then it should be exchanged with 2 concrete pillars every 30cm. Never use 2 pillars with eps locking pins consecutively without consulting the designer engineer.



Reinforcement is placed out into the remaining holes. Then build up other levels with blocks, starting in each corner.

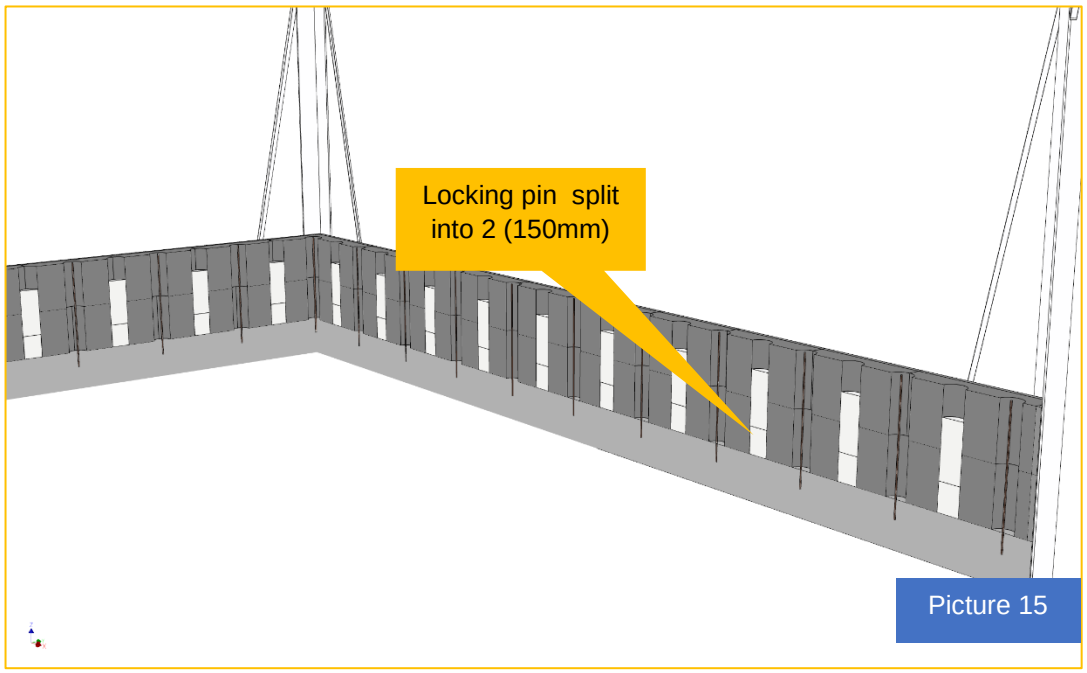
REMEMBER! Nice side up.



Picture 14

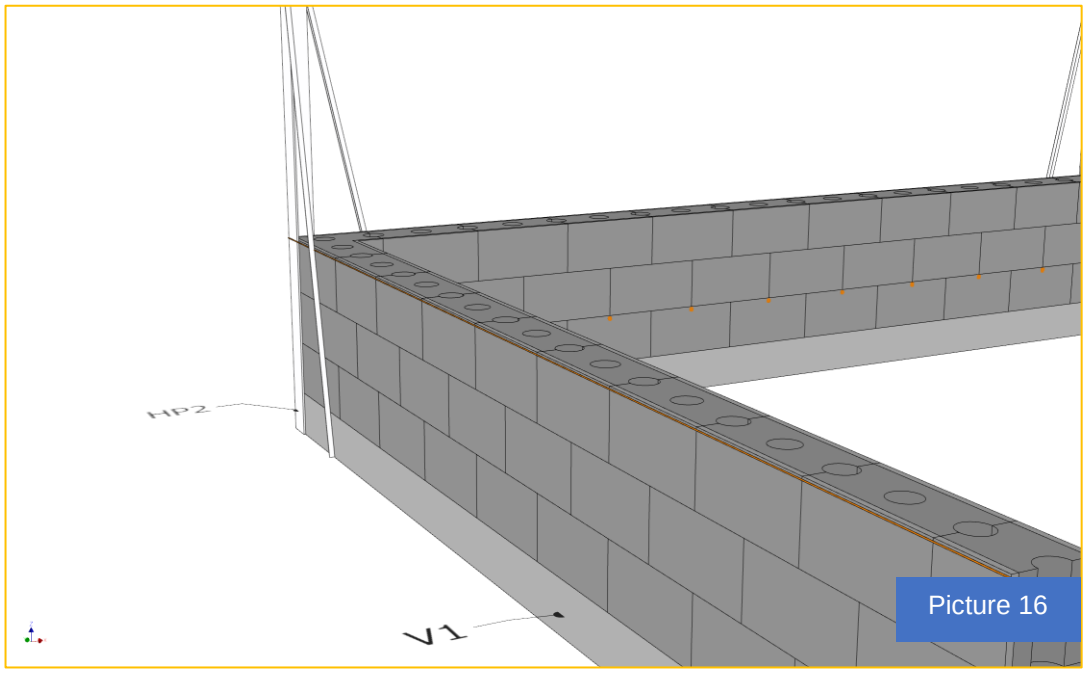
Fill with N-BLOC between all corners. At the door and gate, an N-BLOC is divided into two parts, each of 30cm.

6. Setting av styrepinner.



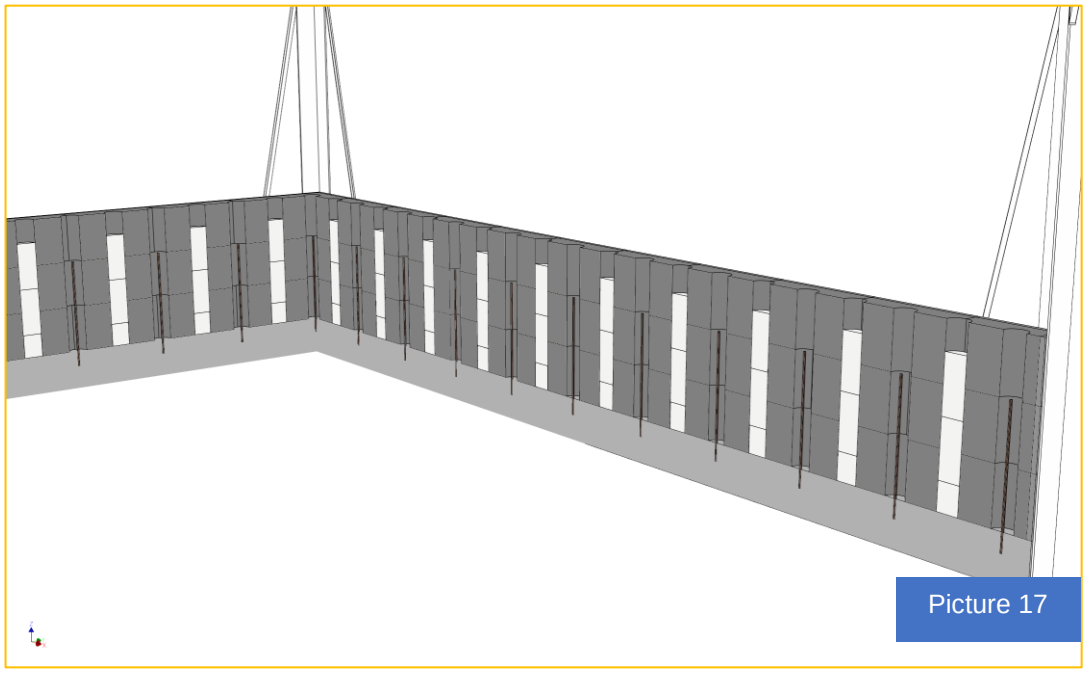
Picture 15

"Picture 15" shows cross sections of the rear wall. We start by dividing the entire locking pins in half. The locking pin should be inserted into all holes where no rebar is inserted. No more locking pins should be inserted in this level at this time (only 1/2 pin in the first shift). Holes under the door in this description can be filled with a whole locking pin.



Picture 16

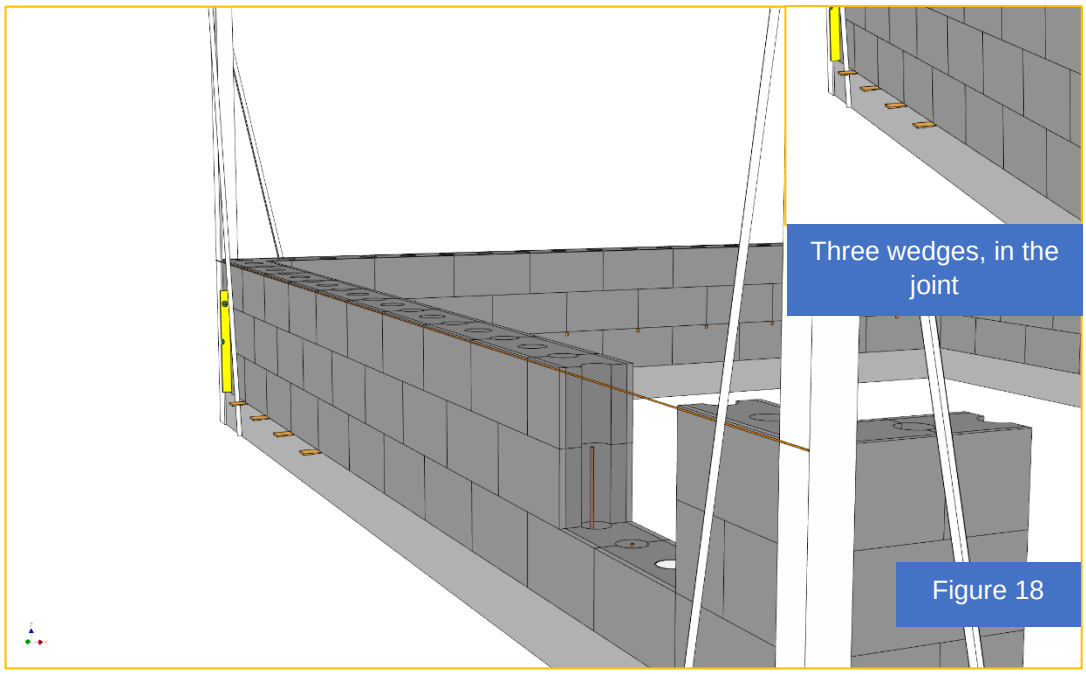
Block like this up to 3 more levels, the use of masonry cords makes it easy to keep the direction.



Picture 17

"Picture 17" shows cross sections of behind the wall after 3 levels of blocks. After level 1 is set and 1/2 locking pin is set we place blocks in level 2. Full-length locking pins are mounted after the blocks are set. Next, we repeat the procedure with level 3 before we put the locking pins (full length). The same procedures apply the next levels. The reason we put locking pins after the blocks have been placed is to avoid that the locking pins push the blocks apart before they are placed.

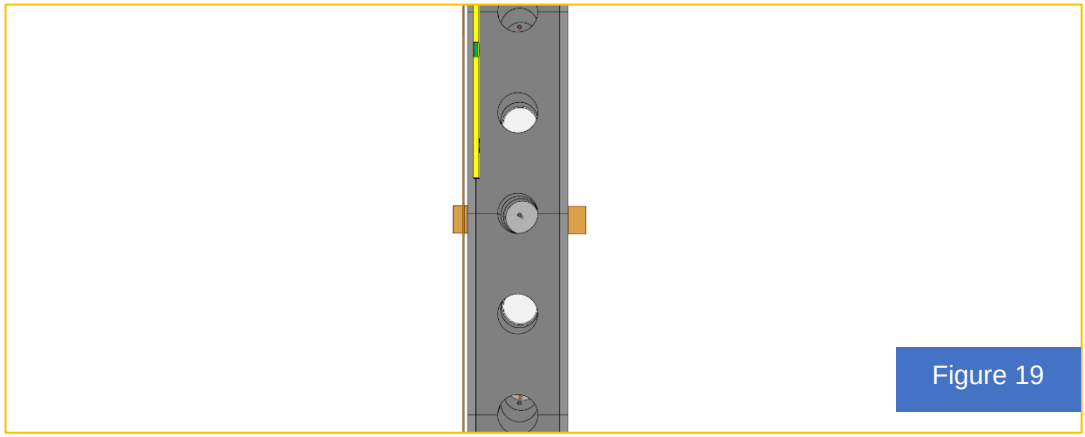
7. Leveling with wooden wedges.



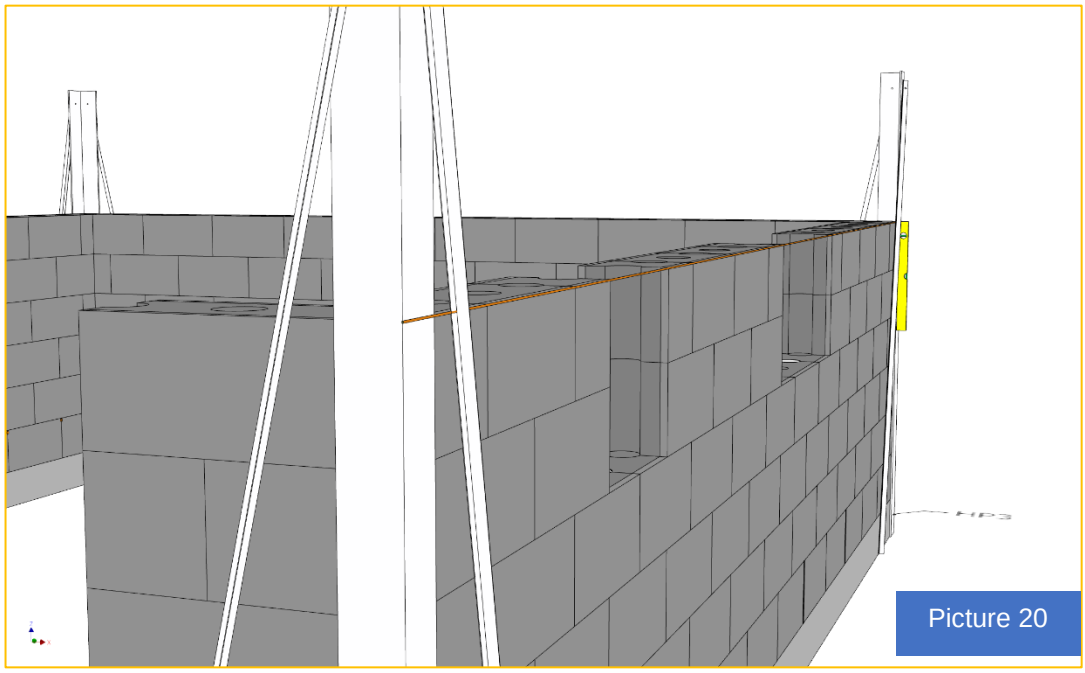
"Figure 18" shows the example for adjusting the wall between HP1 and HP2 tilt out approx. 0.5cm, this is aligned with wooden wedges. Wooden wedges used should be 5-10cm wide. wedges should always be placed in the block joint, not in the middle of the block.

Use a recoil-free hammer to insert wooden wedges.

When 3-4 shifts have been laid, check diagonals and level before further blocking. Interaction between blocks and EPS pins provides good straightening of large wall surfaces.

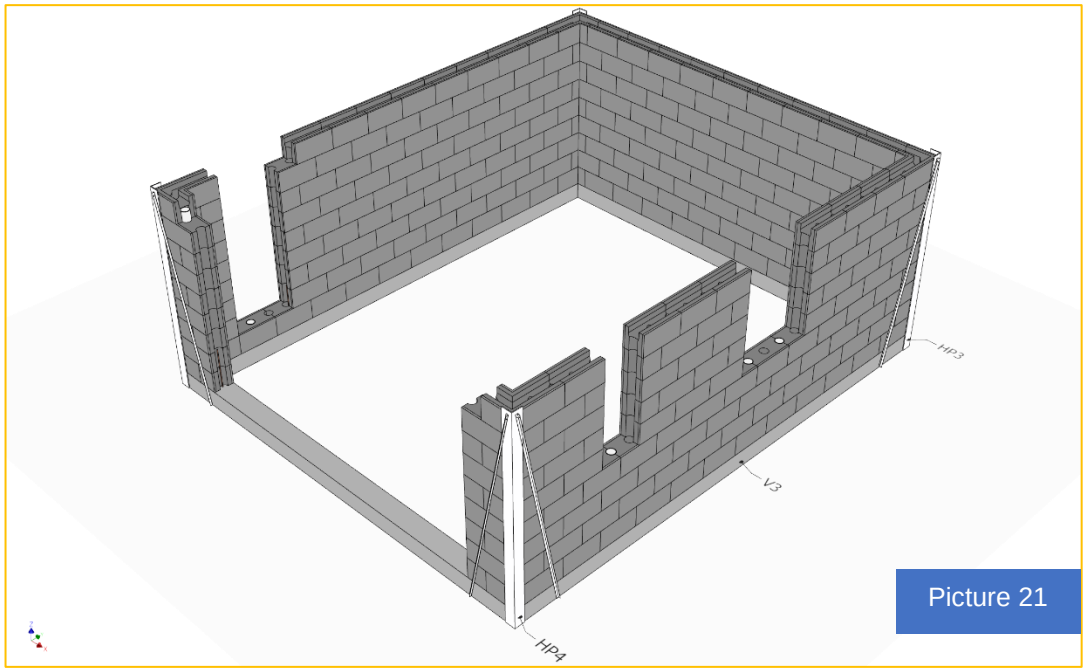


"Figure 19" shows an example of adjustment, with a search of 0.5cm horizontally, this is directed with wedges set against each other, deviations larger than 0.5cm should be arranged before blocking. Wedges should always be placed in the block joint.



Picture 20

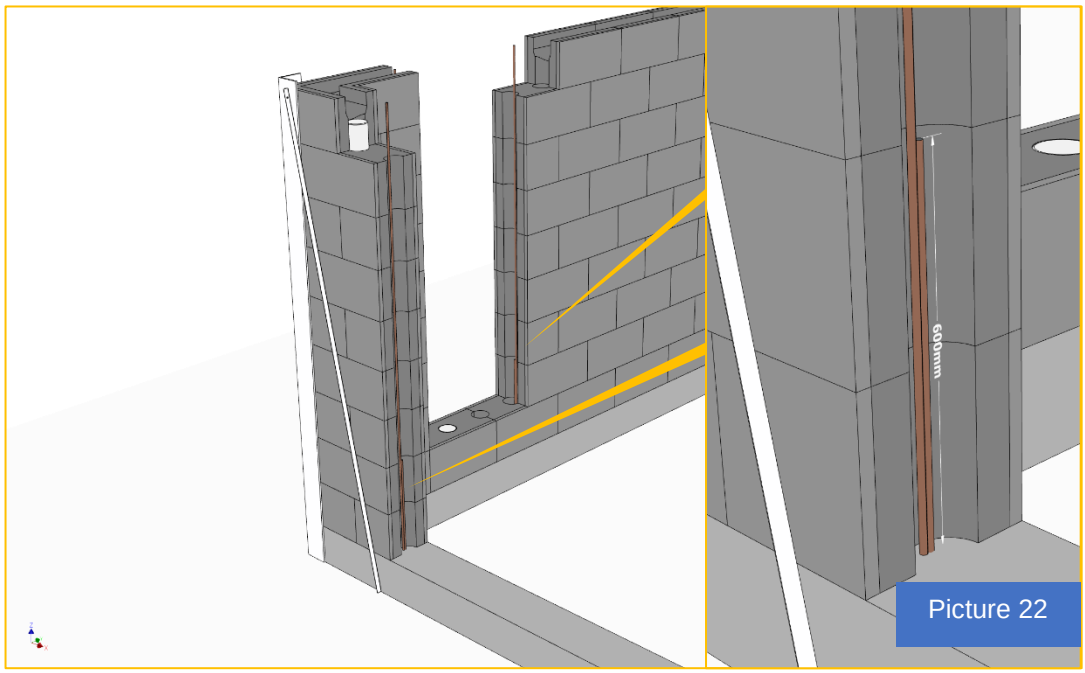
Block then upwards. Keep an eye on the masonry cord and horizontal level, remember to put whole guide pins after each shift with blocks.



Picture 21

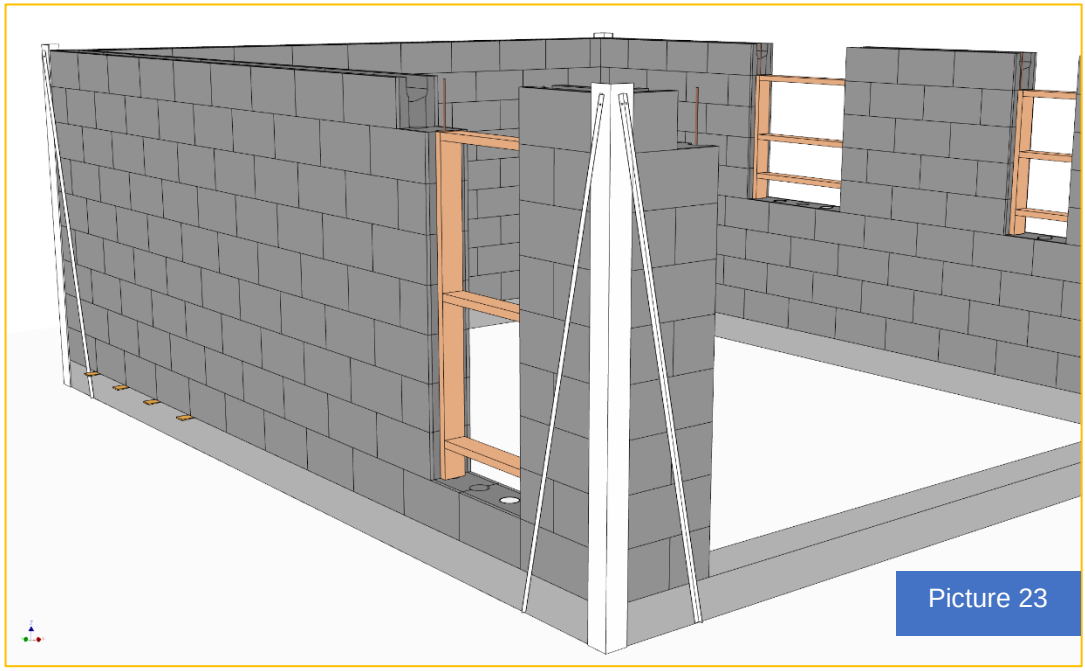
Blocking finished , ready for reinforcement details and bracing.

8. Reinforcements in door, windows and gate.



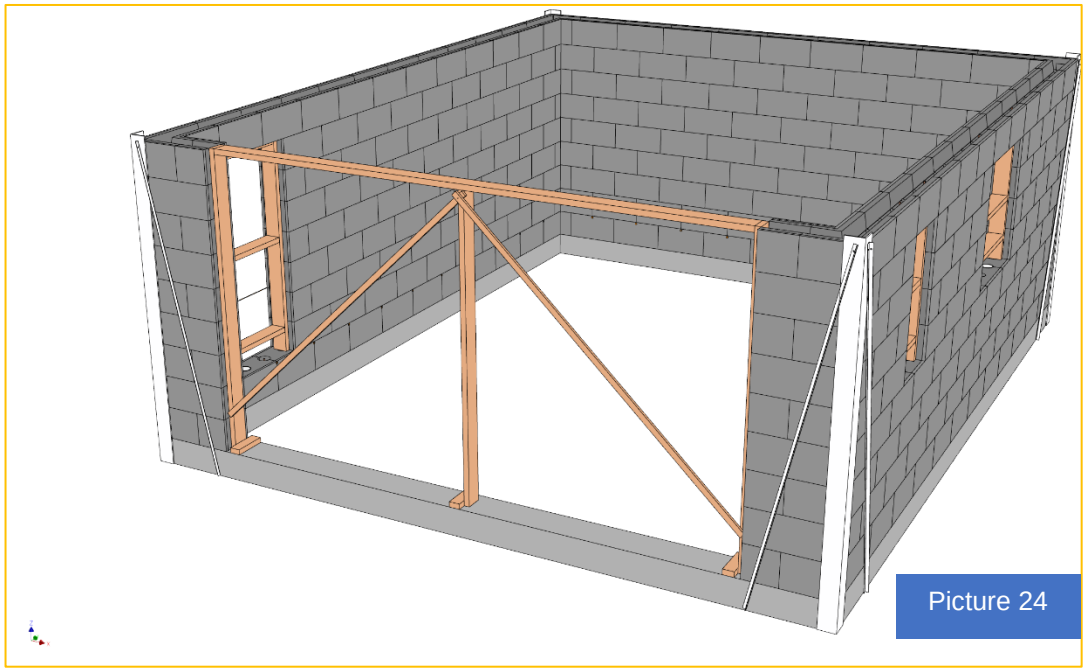
Before bracing, it is recommended to put standing reinforcement in the door, window and gate. To keep the reinforcement in position, use strings that are twisted around the reinforcement and fastened in the block, the top of the reinforcement binned together with reinforcement in the U-BLOC.

9. Avstivning av dør, vindu og port smyg.



Picture 23

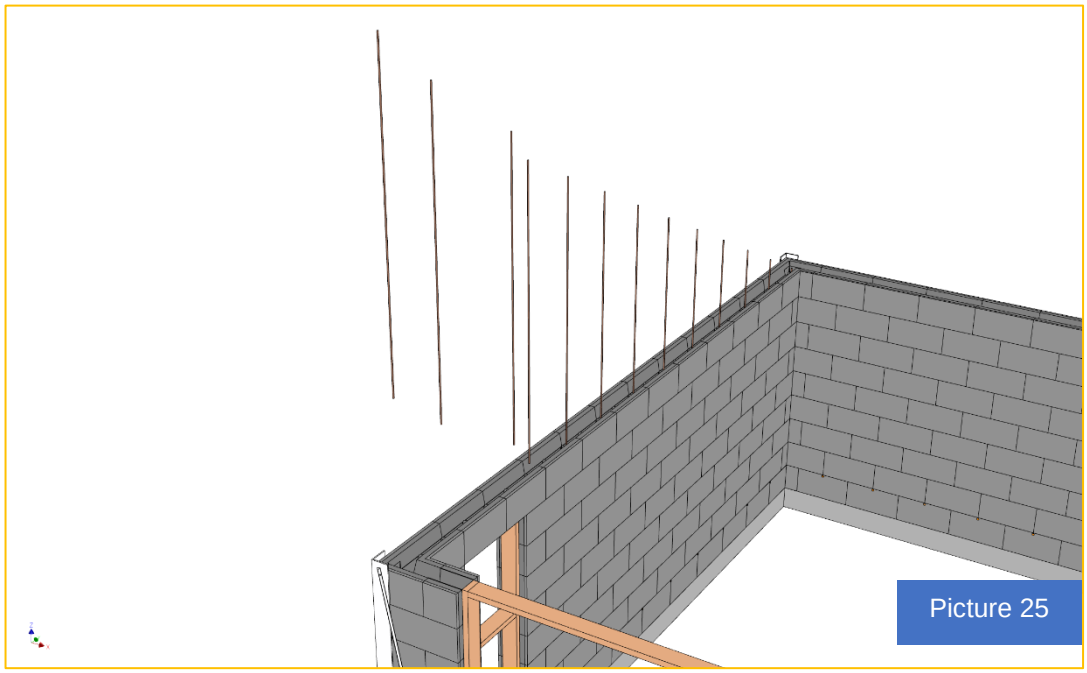
Stiffening of door, window and door openings is done easily with 146x48mm supports, the bottom beam should be set up so far that you can fill concrete in the column below, this is especially important in window openings. The reason why columns under doors and windows are cast out is that the blocks should work homogeneously together. Some window manufacturers also require torque points for large windows / doors. Then place the rest of the U-BLOC over the door and windows.



Picture 24

Principle * / proposal for bracing the gate. (* more bracing is required in the door opening) Should the work stop along the way or in the event of heavy rainfall, the block should be covered on top with a strip of plastic / cardboard to avoid collecting water.

10. Reinforcement of walls.

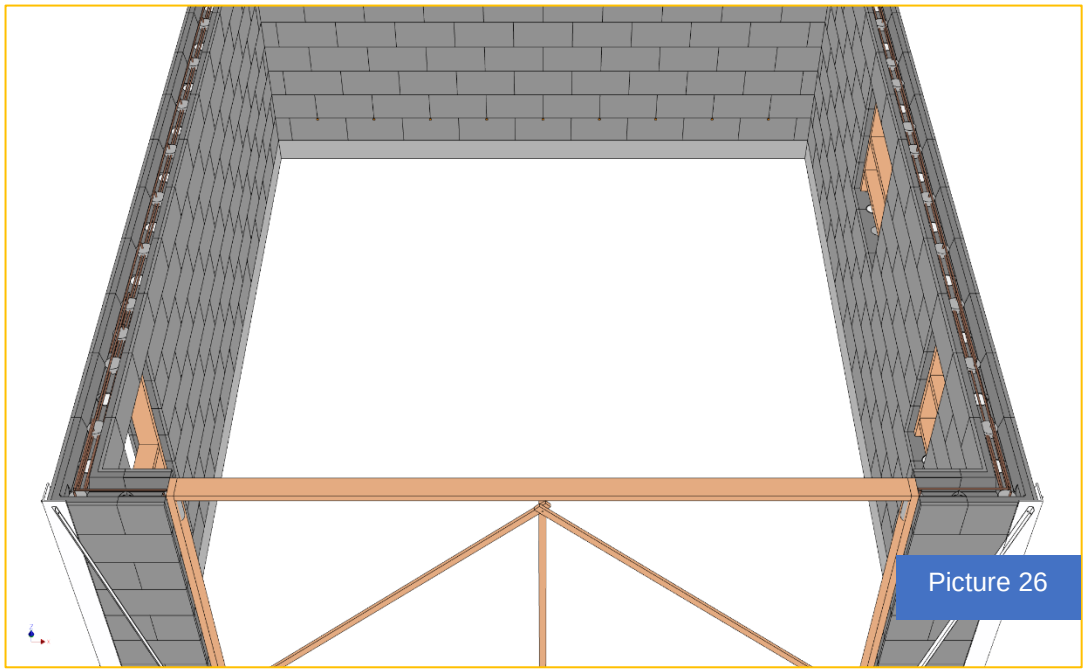


1 or 3 x Ø12mm (with or without backfilling, check table) reinforcement is lowered centrally into empty columns, tied together with reinforcement in U-BLOC, which in this project is 3 x Ø12mm. (2 at the bottom and 1 at the top) NB! Do not drop reinforcement from the top, reinforcement can "bounce" back up!

Please check our reinforcement description when backfilling

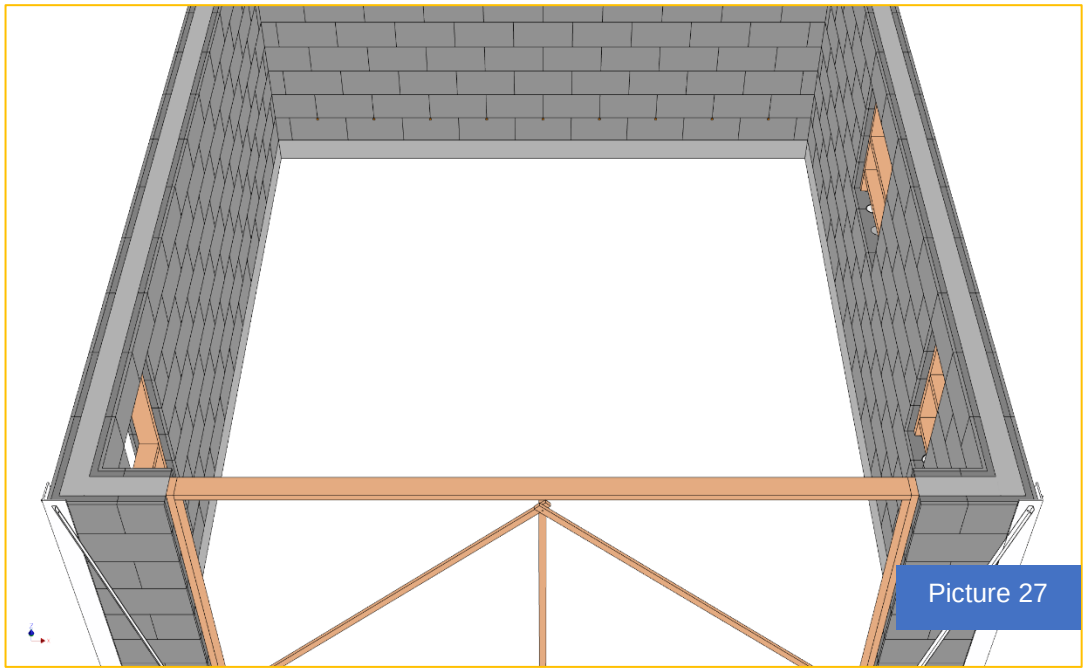
11. Filling concrete.

Filling concrete into wall pillars. Use B30 concrete with 220 slums and 0.8 grains (also called fine batch)



Picture 26

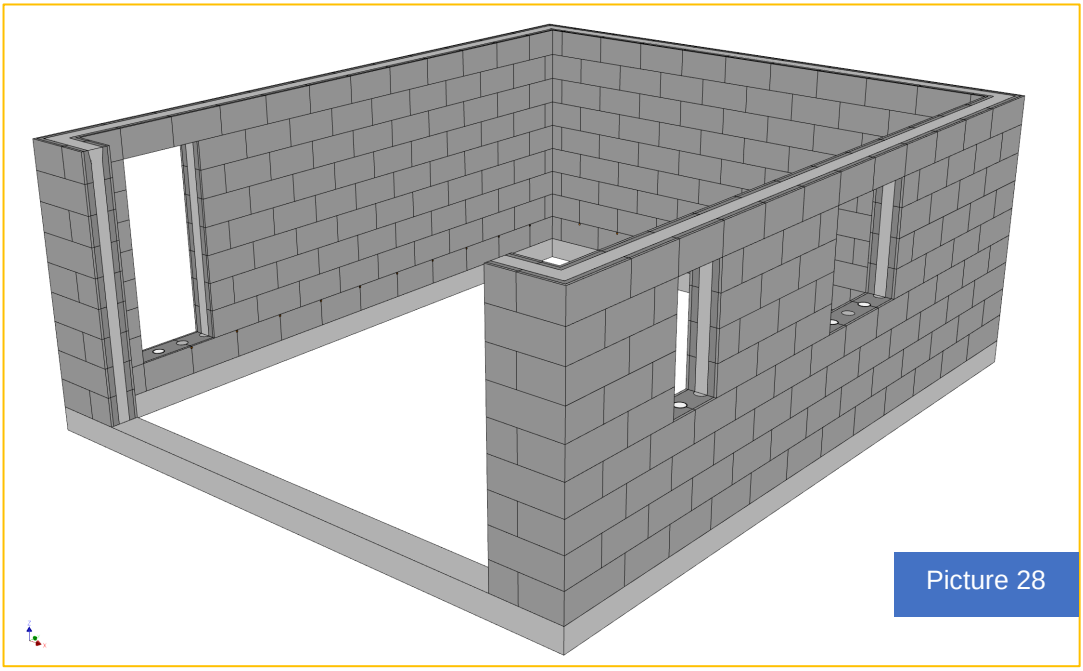
Start in a corner and fill up to **4th level** and continue around, then fill up to **8th level**, finally filling the remaining into columns and U-BLOC. To avoid air in the concrete pillars, knock directly on the reinforcement, vibrator can be used on the reinforcement, but do not use vibrator down in the pillars. The filling is done in one operation. PS place the concrete hose in U block and let the concrete flow down into the columns.



Picture 27

When casting is done, smooth over top.

12. Formwork demolition.



Picture 28

Usually the formwork can be removed 24 hours after casting, but this depends on the temperature and humidity that has been throughout the day.

Externally / internally, the walls are plastered with Smartbloc Fiber plaster or other type of plaster with fibers and fiber mesh. Externally, it is painted with waterproof breathable paint.

REMEMBER! Wear glasses and gloves.