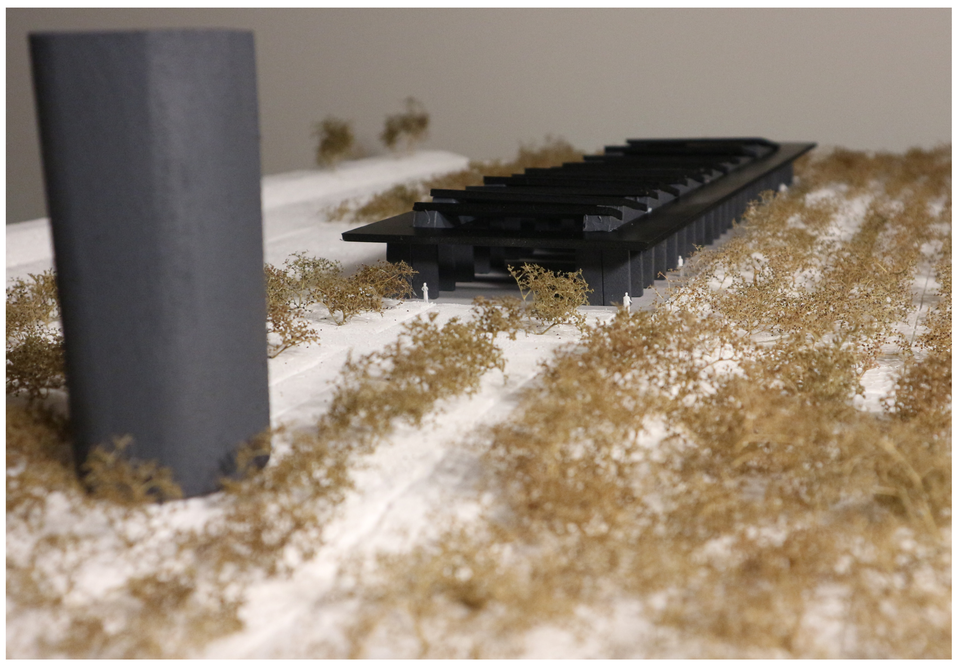
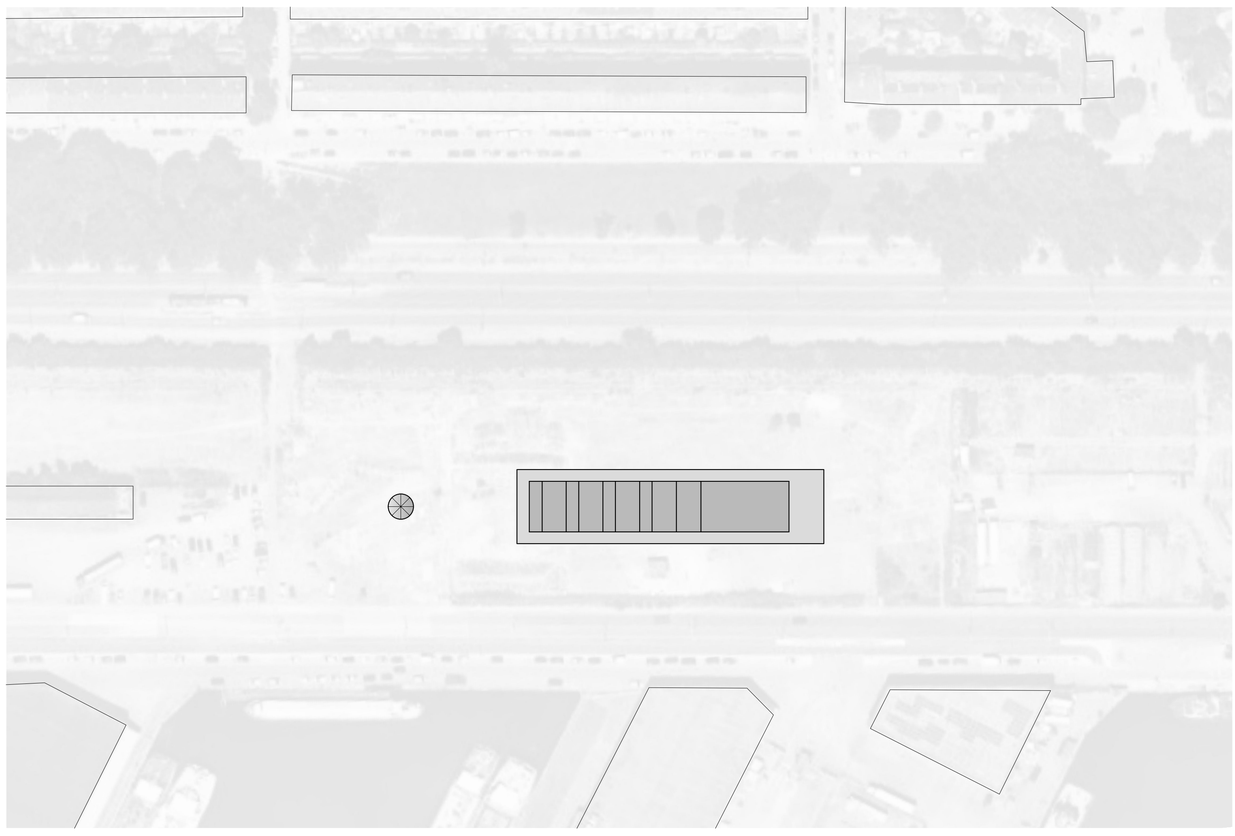
HEMPCLAY FARM

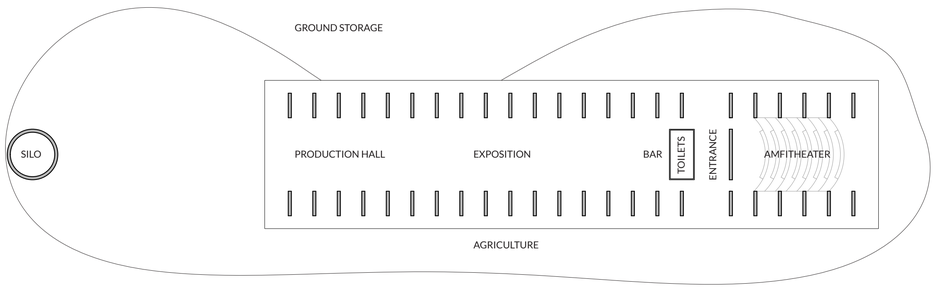
BY GINO CLARIJS - STUDIO GROUNDED MATTER

LOCATION: MARCONIA, ROTTERDAM

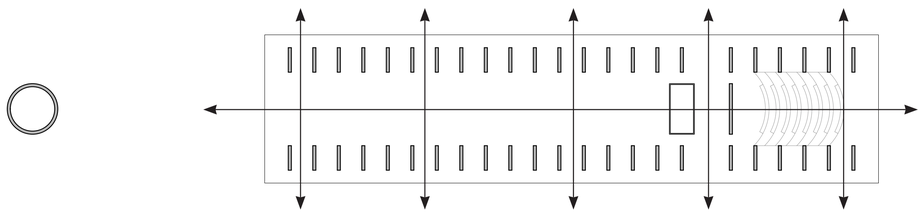


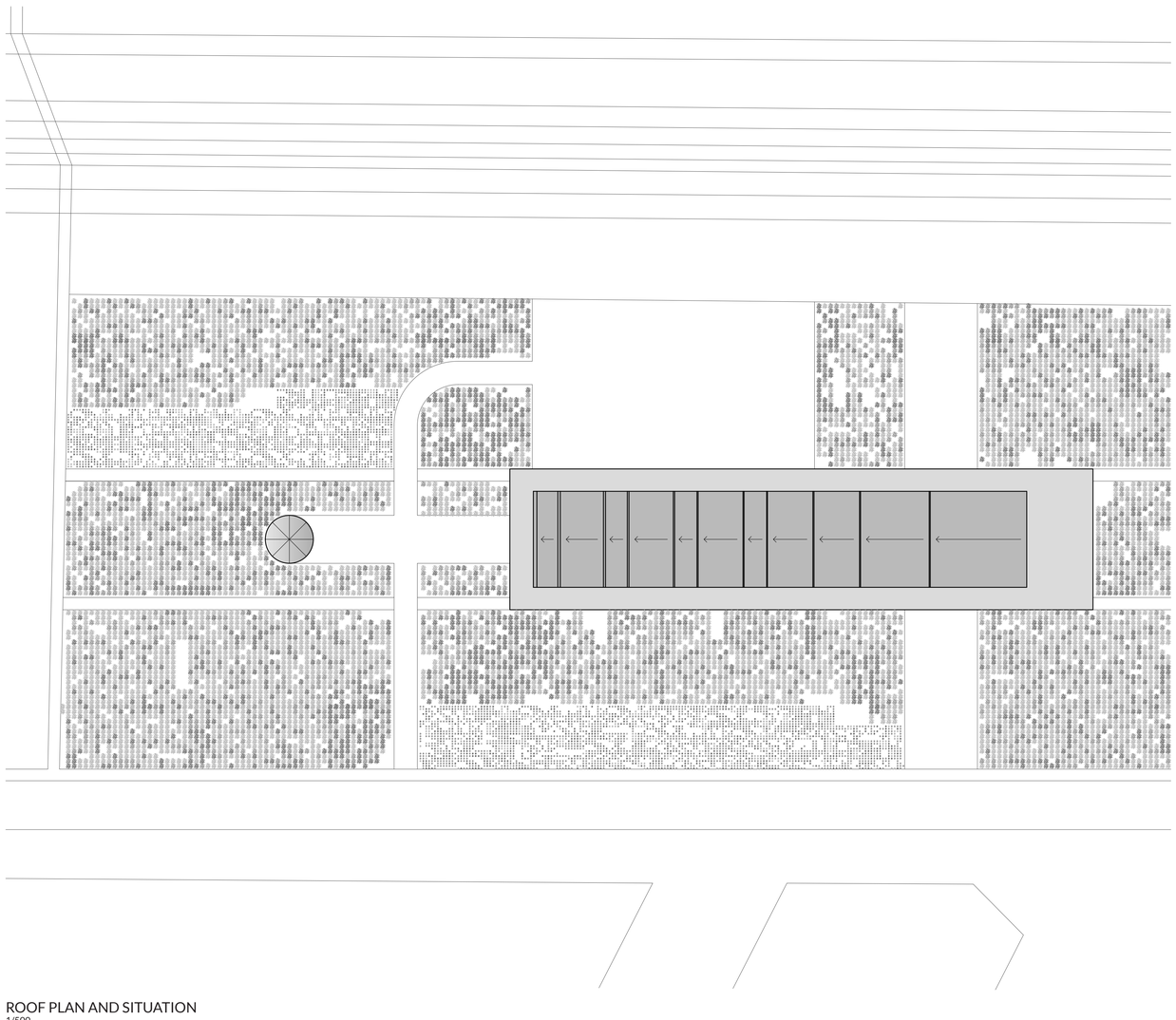


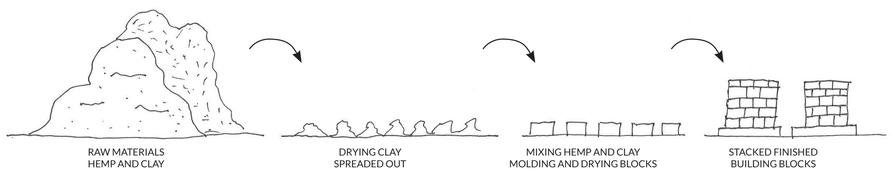
SITUATION - MARCONIA, ROTTERDAM
1/1000



TERRAIN SECTION
1/500







ALTERNATIVE SILO'S

ROOF PLAN AND SITUATION
1/500

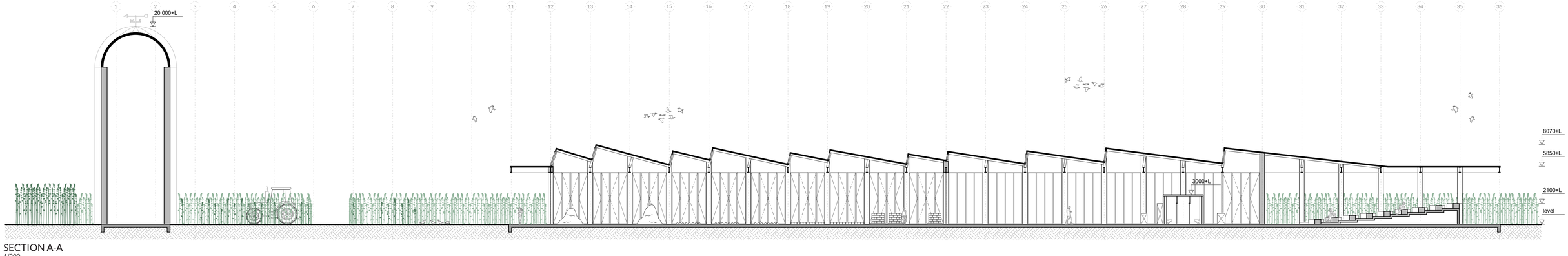
HEMPCLAY INGREDIENTS : 1 PART WATER - 2 PARTS SEACLAY - 3 PARTS HEMPSHIVES (30-50MM)

MIX WATER AND CLAY TO A MUDDY SUBSTANCE
ADD HEMPSHIVES IN SMALL PORTIONS BY KEEPING AN EYE ON THE STICKYNESS OF THE MIXTURE

POUR THE MIXTURE IN THE MOULD AND PUT THE TOP ON
HANDPRESSING GIVES A QUICK AND GOOD RESULT

THE WET FIBRES AND CLAY TAKE A LONG TIME TO DRY
DRYING TIME CAN BE REDUCED BY ADDING PRESSURE WHICH TAKES OUT THE EXTRA WATER

TAKE THE MOULD IMMEDIATLY OFF AFTER PRESSING BY SLIDING THE SIDES OF
A BLOCK OF 10X10X8 CM TAKES ABOUT 3-5 DAYS TO DRY
THE BLOCKS NEED TO BE ROTATED TO PREVENT MOLD AND PLANTS GROWING UNTILL IT IS COMPLETELY DRY



SECTION A-A
1/200

HEMPCLAY FARM

BY GINO CLARIJS - STUDIO GROUNDED MATTER

THE 'HEMPCLAY FARM' IS A BUILDING THAT DERIVES FROM AN EXISTING BUT SLIGHTLY ADJUSTED BUILDING TECHNIQUE. THE DESIGN FOCUSSES ON THE PROCES OF MAKING HEMPCLAY BLOCKS AND TO BE ACTUALLY SURROUNDED BY RAW MATERIALS. IN THE EXPOSITION MOCK-UPS SHOW DIFFERENT AP-PROACHES AND EXPERIMENTS WITH THE MATERIAL. AT THE OTHER END OF THE BUILDING THE AMFITHEATER GIVES AN OPPORTUNITY TO TEACH ABOUT NEW BUILDING TECHNIQUES OR GIVE OPEN SEMINARS.

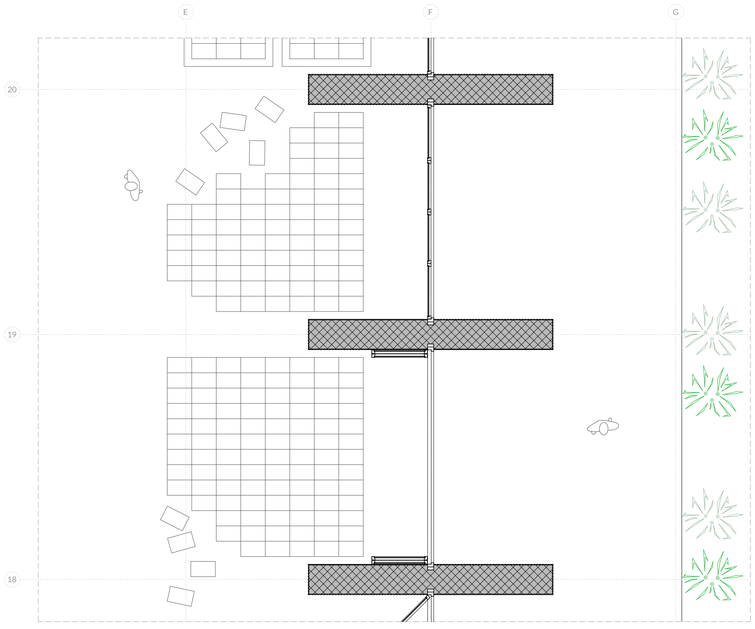
WITHIN THE FIELDS OF THE SURROUNDING AGRICULTURAL LAND THERE IS A SILO USED AS STORAGE OF THE HEMPSHIVES. THE ROOF IS ANGLED IN A WAY THAT THERE ARE MULTIPLE CHANCES TO SEE THE TOP OF THE SILO EVERYWHERE IN THE BUILDING WHERE THE BOTTOM IS ALSO VISIBLE. THIS GIVES THE OPPORTUNITY TO SEE THE WHOLE PROCES IN ONE VIEW. THE STEEL ROOF IS MADE FROM STEEL AROUND THE SITE, FROM DIFFERENT PRODUCTION HALLS WHICH ARE GOING TO BE DEMOLISHED FOR RESIDENTIAL DEVELOPMENT.

THE FRAGMENTATION IN THE FACADE IS MADE WITH HEMPCLAY WALLS, WHICH FRAMES THE STEPS THAT ARE USED TO MAKE THE HEMPCLAY BLOCKS. THE PRODUCTION HALL CAN BE OPENED COMPLETELY IN THE SUMMER TO SHORTEN THE DRYTIME OF THE BLOCKS.

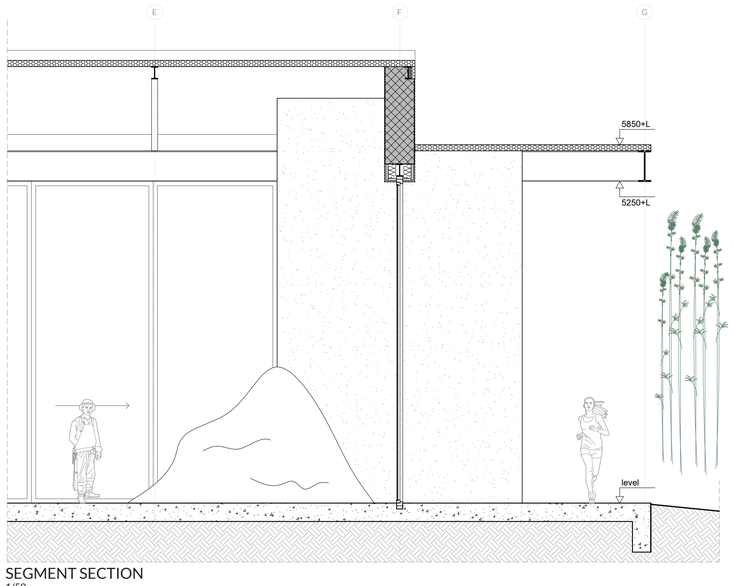
HEMPCLAY IS A CO2-NEGATIVE MATERIAL THAT MIXES HEMPSHIVES WITH CLAY. THE CLAY FOR THIS PARTICULAR BUILDING IS SEACLAY, WHICH HAS A BIT MORE NATURAL WATERRESISTANCE AND IS VERY ADHESIVE. HEMPSHIVES ARE VERY STRONG FIBRES, WHICH ARE GREAT FOR BONDING AND ISOLATION. COMBINING THESE MATERIALS WITH WATER CAN BE MADE IN A PRESSED BLOCK, EITHER BY HAND OR BY MACHINE.

THE SITE IS POLUTED WITH HEAVY METALS. HOWEVER, HEMP HAS THE PROPERTY TO QUICKLY RESTORE THE GROUND WITHOUT ANY PESTICIDES. IT IS A VERY STRONG PLANT THAT GROWS FAST AND CAN BE USED IN CIRCULAR AGRICULTURE. THE PLANTS ON THIS SITE ARE EUROPEAN APPROVED BREEDS WHICH CARRY LOWER AMMOUNTS OF PSYCHO-ACTIVE INGREDIENTS.

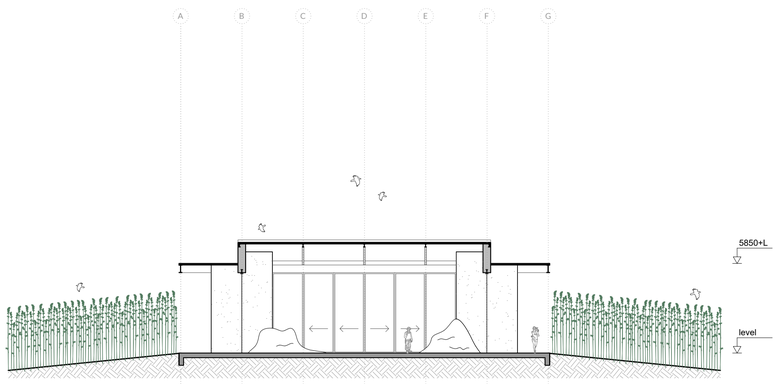
THE BUILDING IS AN EXPOSITION OF THE MATERIAL, EMBEDDED AND SURROUNDED BY ITS OWN INGREDIENTS. BY SHOWING THE EASY PROCES, THIS COULD RESULT IN A BIGGER POPULARITY AND ATTENTION FOR ALTERNATIVE BUILDING MATERIALS. IT'S A STATEMENT AGAINST THE BAKED PRINCIPLES, AND TRIES TO INVIGORATE THE DEVELOPMENT IN THESE ALTERNATIVE MATERIALS.



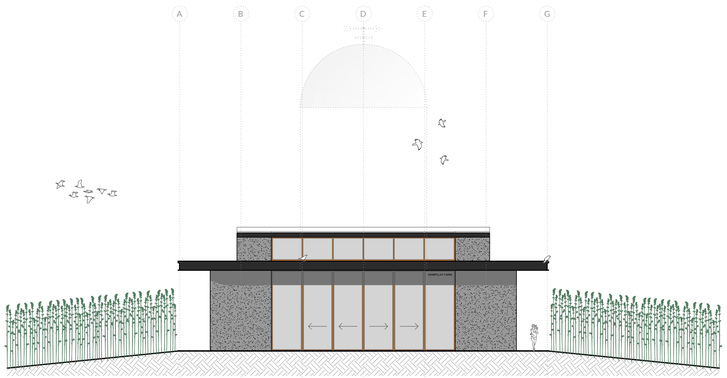
SEGMENT PLAN
1/50



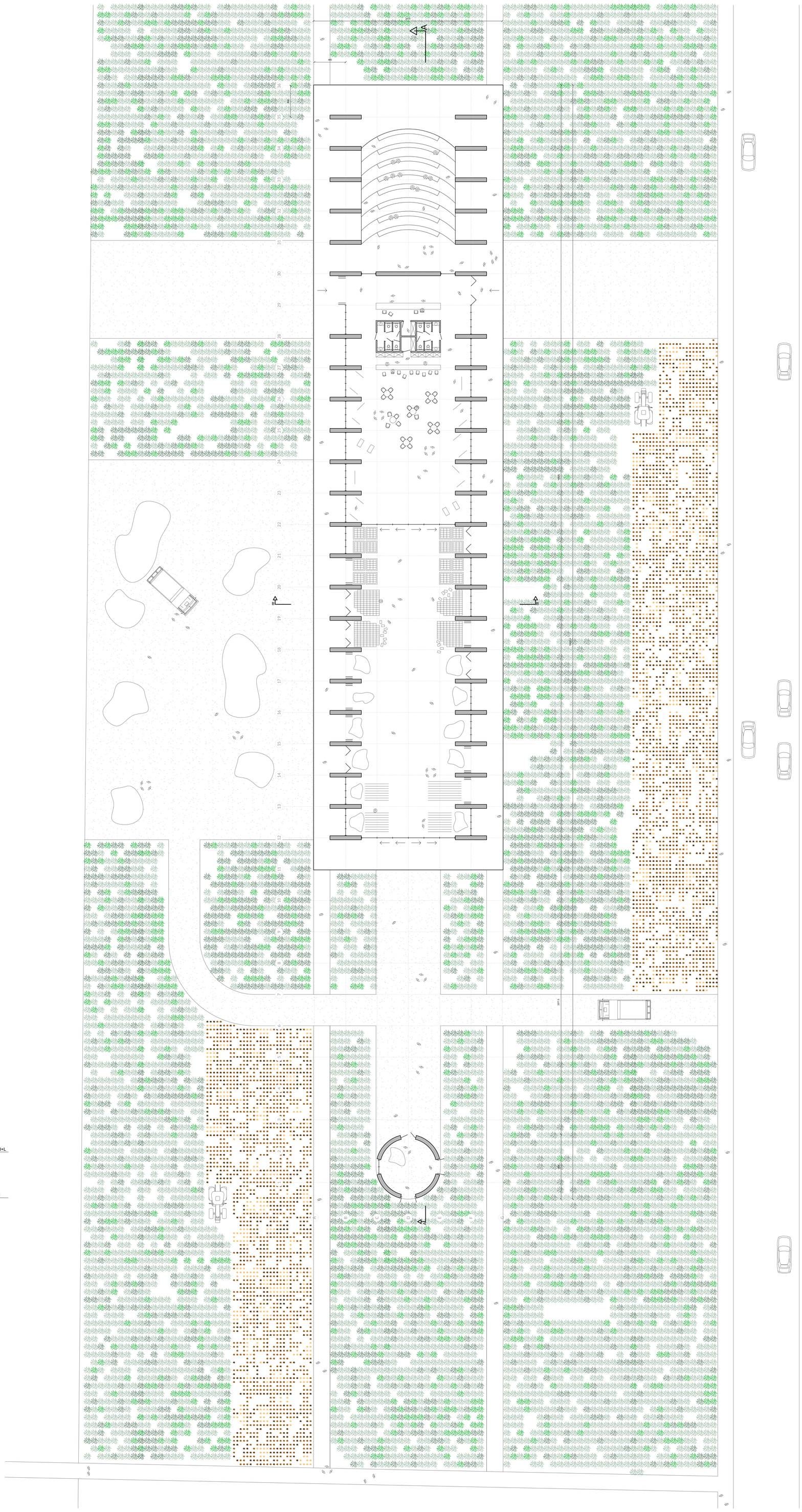
SEGMENT SECTION
1/50



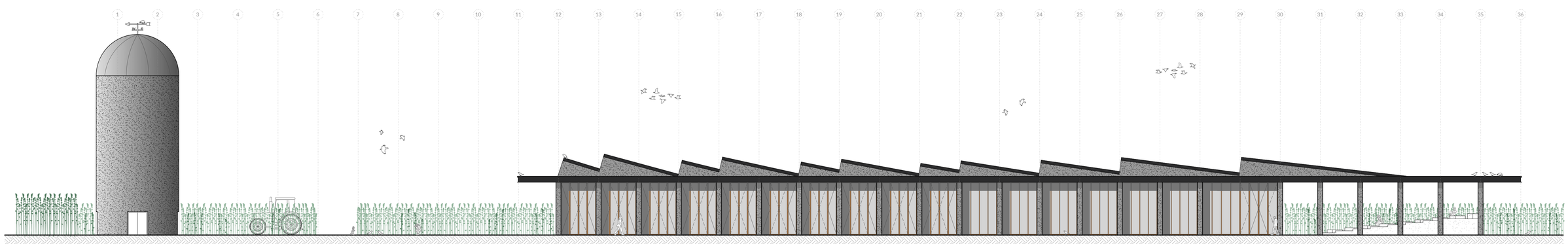
SECTION B-B
1/200



WEST FACADE - BETWEEN TOWER AND PRODUCTION HALL
1/200



PLAN AND SITUATION
1/200



SOUTH FACADE
1/200

Hemp-Clay: Reinvigorate the hemp addiction with clay catalyst

Gino Clarijs, 15 December 2021

As long as civilization on earth has been settling, it has either used earth as a component or a main material for building houses and buildings. Today, we mostly use it as baked bricks or in a mixture with cement for concrete, but the raw earth usage has totally disappeared in the modern western world.

Currently we live in a society with multiple crises, which we all try to resolve in a short-sighted way. Resolving the climate crisis relies on a reduction of CO^2-emission, while the government uses questionable calculating methods, for instance lowering maximum speed to increase building activity, to 'proof' a lower emission with small changes in society. The housing crisis is countered by smart, easy, affordable and carbon neutral building, but we still use the same expensive and polluting methods such as concrete, brick and aluminium. Resolving the energy crisis relies on smart usage of fossil and non-fossil fuels, while we are mining minerals from all over the world to use a 'technical smart' solution.

The crises just mentioned aren't the only problem we, the world, have to counter. The amount of sand which can be used as a material in current building principles, is becoming globally scarce.[1] Farmlands are using more phosphor, which is getting scarce on itself[2], and pesticides to maintain production to the amount of demand. The use of these minerals and pesticides are indirectly polluting our groundwater. Therefore a circular agriculture is currently in place to reduce the use of extra polluting minerals. But how can these crises help in exploring old and new building principles?

Raw earth can be a solution to a lot of these crises. It's all around us and we can use it without too much transportation. It doesn't need an extra chemical reaction, other than adding water to the mixture with gravel, straw or any other material. This means it tackles some of the main issues in some of the current crises. Hemp-Clay[3] is one of these interesting materials that uses clay. The combination of reusable components and CO^2-neutral nature fits the current trend and actuality.

A mixture of clay, hemp and water makes Hemp-Clay. Hemp is an interesting solution with its high value of absorption of carbon dioxide and as a part of the agricultural cycle. Hemp-Clay is an alternative to Hemp-Lime, which is also viable, but uses lime instead of clay. In some cases there is also cement added to the mixture to decrease drying time. The biggest difference with lime is the amount of heat that is necessary to acquire it, while clay can be found anywhere in the Netherlands. The main benefit of lime is the water resistance and quick drying aspect, while clay on itself needs some extra help for water resistance and more time to dry. There is an alternative to lime, the natural hydraulic lime (NHL). These are acquired with a much lower temperature and have the same benefits as regular lime. The Hemp-Clay combination however has no emission in the production of the pure materials. But why could Hemp-Clay be interesting as a building material in the Netherlands?

Sea and river clay are very common in the Netherlands, but isn't used much as a raw building material.[4] We have lost the principle of using it without baking or mixing with cement in the building industry. For dikes we are still using the raw portion of it, but not all types of clay are useful. River clay is mainly used for baked bricks, while sea clay is used in agriculture. River clay is finer than sea clay, which makes it more adhesive, while sea clay has naturally more lime in the mixture coming from seashells. The water resistance is important for a climate such as in the Netherlands. The

regularly rainfalls and wet weather really has it's impact on the building materials. The adhesiveness could be important to combine it with other materials, such as hemp, to keep it together. The amount of adhesiveness however needs to be carefully tested with the different mixtures to see which clay is the better solution. However there is more sea clay than river clay in the Netherlands, which makes it more interesting to use. The lime naturally added in the clay gives it a real benefit to the quality in stability and water resistance.

Hemp as a material, however, has some issues with its reputation. Before 1928 it was wildly cultivated around the world for cloths, sails and ropes. The 'Opium law' banned cannabis usage because of the increasing problems as drug abuse. It wasn't until early 90's when hemp relived and cultivation was possible with strict quality requirements on the amount of 'psycho-active ingredients'. A list of approved species[5] returned the plants back onto farmlands. The main value of hemp is its cultivation properties. During growth the plant absorbs a high amount of carbon dioxide. It's also a plant that grows easy in large amounts. The amount of pesticides and herbicides that need to be used are much lower than other crops, which makes it very valuable in the principle of circular agriculture.

Combining hemp and clay as a building material could be one of the ingredients to find a solution to multiple crises. This material still needs to be investigated and tested more, but first attempts seem promising. There are projects which work with poured walls of Hemp-Clay, as well as pre-made bricks such as Cannabrick. Hemp is already being used in other industries, such as clothing, paper and biofuels. If this material is acknowledged in the building industry, maybe hemp could further positively lose its addictive drug image and become a serious contender in the fight against global warming.

[1]: Van Zon, H. (2020, 3 May). Zand wordt zo schaars als water en leidt tot oorlog. *Algemeen Dagblad*. https://www.ad.nl/wetenschap/zand-wordt-zo-schaars-als-water-en-leidt-tot-oorlog~ab31a60e/

[2]: NTR [NPO 3]. (2020, 2 April). *Bodem in Zicht – Fosfaat* [Video]. www.npostart.nl. https://www.npostart.nl/bodem-in-zicht/02-04-2020/VPWON_1309237

[3]: Livingcraft. (n.d.). *The Hemp Clay Experience*. https://livingcraft.design/. Consulted on 4 November 2021, https://livingcraft.design/the-hemp-clay-experience/

[4]: LBP Sight, Levels-Vermeer, J. B. & Simons, H. A. E. (2018, January). *Perspectief op schaarst* (R056095aaa.17GZJ55.jlv). https://puc.overheid.nl/PUC/Handlers/DownloadDocument.ashx?identifier=PUC_159730_31&versienummer=1

[5]: Wikipedia contributors. (n.d.). *List of hemp varieties*. Wikipedia. Consulted on 17 November 2021, https://en.wikipedia.org/wiki/List_of_hemp_varieties#For_European_production