ARCHITECTURE IN STONE

An active quarry is a constantly changing landscape. Its raw and edgy character express an ongoing conflict between nature on the one hand, and human influence on the other. This inspired the design of a building carved out of the rock by the diamond wire saw, a technique used in the quarrying process.

The approach of the project was to make a factory producing building- and paving-stones from waste material provided by the quarry, and to show the characteristics and potential of the available stone in the architecture.

The larvikite rock dates back 300 million years. The crossover of architecture and nature in this building therefore pushes the concept of time to the forefront. It raises the question of what the site used to be, what it is now and what it might become in the future.

The site: Klåstad Larvikite quarry in Larvik, Norway.
I became curious about rock as building material after a visit to a schist factory during a master course last year. I began imagining what kind of spaces I could potentially create of stone in present day architecture; with stone as the main constructive element, not just as a decorative element.

After many conversations with stone enthusiasts, I was recommended a visit to Lundhs AS in Larvik for viewing the Larvikite stone quarries and visit a stone factory. I chose to continue working with the larvikite stone, unique to Norway. It is a very hard and dense stone similar to granite (more information about the characteristics of larvikite can be found in the pre-diploma on p. 20).
THE PROGRAM

My visit to Larvik put me in contact with a company producing buildingstones out of waste material from the quarry. I decided to make this the function of the factory. I see it as a missing link of all the processes happening on site, considering the average waste percentage from quarries are 50% of extracted stone.

The factory producing building- and paving-stones from waste material:

1. Splitting line: large splitting machine; medium splitting machine; two smaller splitting machines
2. Saw line: large wire saw; Water jet for surface finishing; Multi-blade saw

Finished products in sizes up to 1 x 1 x 2.5 m.
The Quarry extraction process

- Developing a new quarry
- clearing the top surface
- clearing the facing surface
- clearing and preparing the size of the block
- drilling holes
- insert diamond wire through holes

- Start sawing the base of the block
- then sawing the sides of the block
- cut the large block into smaller blocks, about 8x6x2 m
- the blocks are divided into smaller blocks for transporting
- the blocks are divided by the intention to use as much of the stone as possible and to avoid "mistakes"

Preferable raw block dimensions are 1500 x 1800 x 3000 mm. The blocks containing flaws or unwanted shapes are discarded to the waste pile.
THE UNDERGROUND QUARRY

There are two ways of developing and running a quarry. There is the open casket quarry as my site in Kåstad, and the underground quarry. The underground quarry became the architectural reference of my project.
Making models and charcoal sketches investigating how to cut out spaces with the diamond wire saw:
THE SITE

The dotted line to the right shows the positioning in the quarry. The factory entrances go onto the ramp leading up from the quarry. The position was chosen to make a connection from the top and down to today's bottom of the quarry. Another important parameter was sunlight as the spaces I create will be very deep and dark.

Klåstad quarry, picture owned by Lundhs AS

3D model of the quarry mapped by a drone, by Aerial geo survey
THE PROJECT

The spaces are constructed by using the diamond wire saw to create an architecture in direct relation to the human made landscape. The function; the stone factory with its machines and infrastructure, is in this project put as a layer on top of the spaces in stone; that alone create a timeless atmosphere.

The drawings of sections below show the quarry in past, present and future.
1. Storage underneath administration part of the building
2. Production hall
3. Space for collecting water used in working with stone.
Plan 1:200

1. Office
2. Kitchen
3. Meetingroom
4. Changing rooms and bathrooms

Plans of administration, no scale

Section CC 1:200

Section CC, no scale
Entering the factory from the quarry

Entering the administration, viewing the light openings to the production hall
Entering the water dam space

The water dam space
Entering the production hall

The production hall